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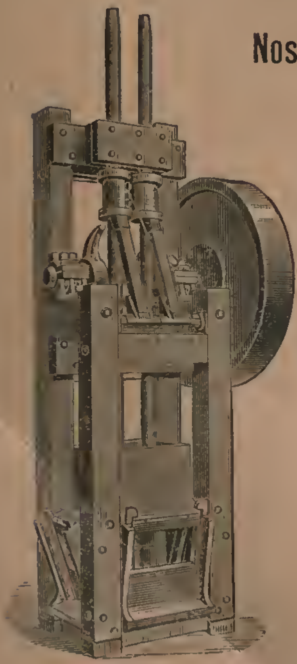

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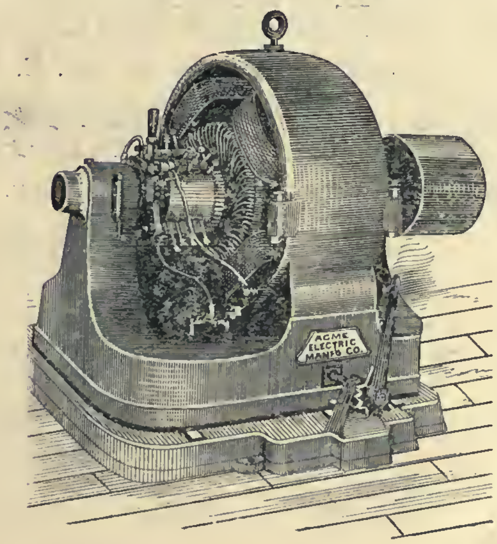
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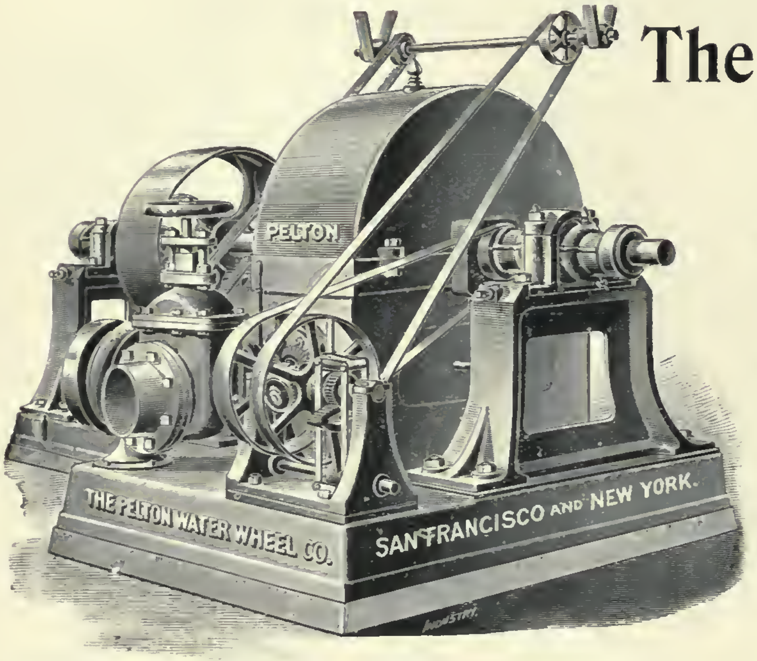
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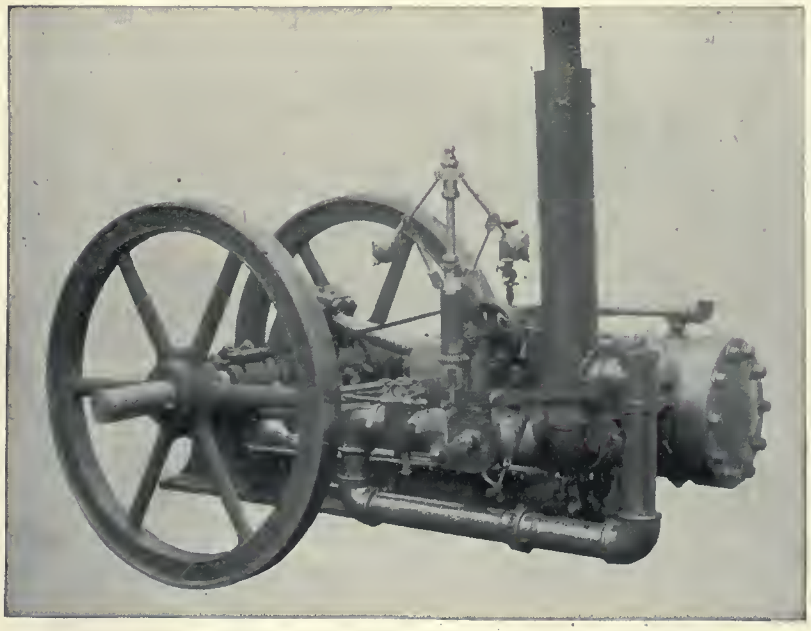

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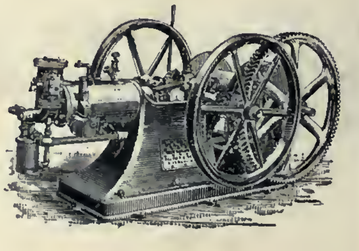

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PACIFIC ELECTRICIAN

VOL. XVIII. MAY, 1897 No. 5

EXPERIMENTAL HEAVY RAILROAD WORK.

The trend taken by the railway industry in the direction of the field hitherto occupied exclusively by the steam locomotive, as evinced by the recent developments on the New York, New Haven and Hartford and Baltimore and Ohio railroads, has caused the General Electric Company to provide itself with its own special line of track upon which to carry out electric traction experiments. This last step marks the latest degree in the evolution of electricity as a traction agent. Beginning with the early motors of Van Depoele and Sprague, and following along the lines of those built for inter-urban service, elevated, suburban and branch steam lines and reaching the huge 360 H. P. motors giving a draw bar pull of 60,000 lbs., on the great electric engines on the Baltimore & Ohio railway, the next step is the perfection of what has been already accomplished, and the development along lines already indicated of some feasible method of electric traction which can be adapted to long distance railroads, efficiently and economically, and, therefore, commercially.

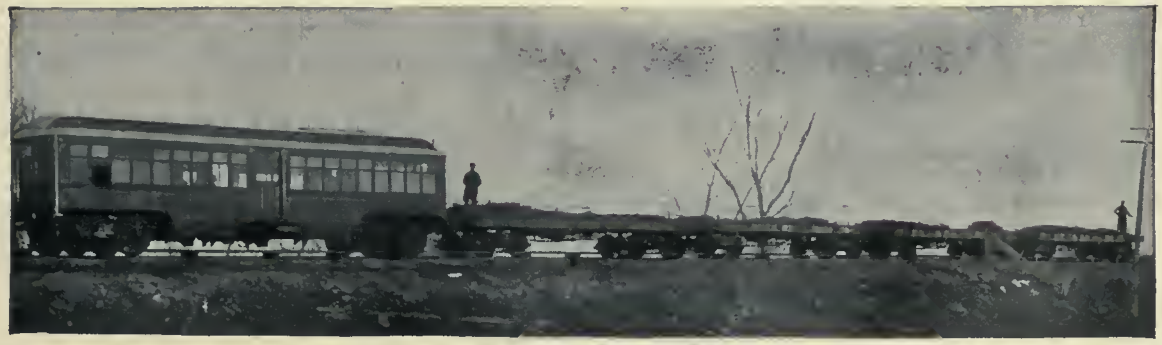


FIG. 1.—MOTOR CAR HAULING FOUR LOADED FLAT CARS ON GENERAL ELECTRIC EXPERIMENTAL TRACK.

The line of track built by the General Electric Company, lies between the works at Schenectady and the Erie Canal. It has been laid upon the heel path, is 6700 feet long, and is of the regulation New York Central railroad construction, the service rails being standard rails 85 pounds to the yard. It is upon this track that almost daily equipments are tried under different steam road conditions and bursts of speed made and efficiencies recorded of a more than encouraging nature.

The track is laid from the side of building No. 7, and crossing the river road rises on a gradient of 4 per cent to the level of the heel path. The first section of the line is a tangent 2415 feet long, the second a series of short tangents and curves 1635 feet long and the third another tangent 2730 feet in length.

Running beside the track on the far side from the canal are the conductor rails. Of these there are two running, parallel with each other and the track, from the top of the first gradient to the end of the line. They are 30 pound rails, set on eight inch ash blocks treated with bergtheer in vacuum pans and thoroughly impregnated. The two sets of conductor rails have been laid down for the purpose of experiment with alternating multiphase currents. For

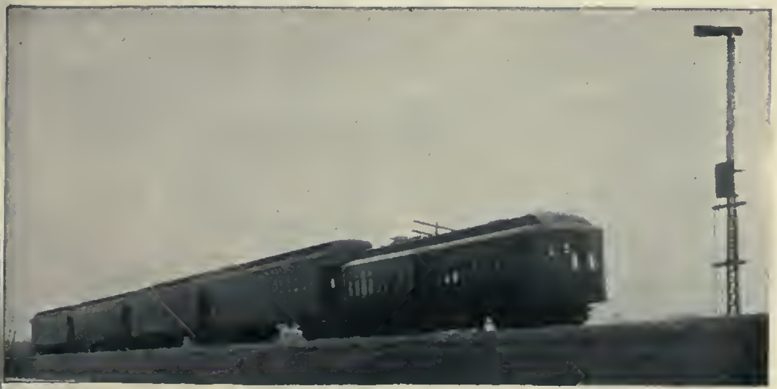
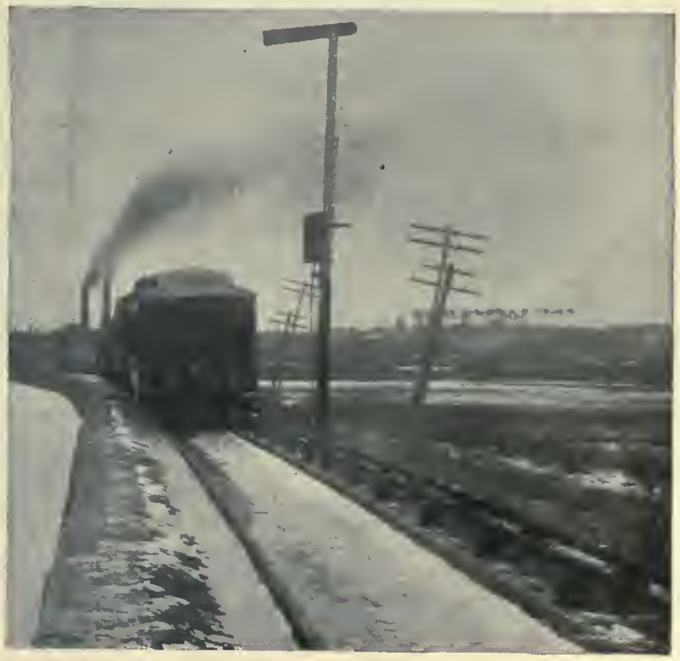


FIG. 2.—G. E. MOTOR CAR HAULING FOUR STANDARD PASSENGER COACHES.



direct current experiments two rails are connected in multiple. Both service and conductor rails are bonded with 0000 copper bonds.

The current is taken from the Works Power House, over a line issuing from the back of the testing department. The feeder is a 500,000 c. m. insulated cable, running by the track for a distance of about 5500 feet. The line is divided into three working sections, each controlled by its own switch and semaphore. Then this switch is closed, its section of conductor is made alive, and the movement of the switch handle sets the semaphore.

The experiments made so far have been carried on for the purppose of developing motors and systems of operation for elevated and surface steam roads. For locomotive a special eight wheeled car is used. This resembles a regular passenger coach so constructed as to give an unobstructed access to the two motor trucks. The weight of this coach-locomotive equipped is about 30 tons empty. It is divided into three sections—a driving and testing department in front, a passenger division in the centre, and a rear compartment in which are carried the air pump, tools, etc.

The equipment of the forward compartment consists of a skeleton wooden switchboard carrying the ammeters voltmeters, wattmeters, etc., to enable the engineer to gauge exactly and record the performance of the specific motor equipment which may be under experiment at any stated time. In addition the switchboard is fitted with the necessary quick break switches, magnetic blow-out, fuse boxes, automatic circuit breakers, etc. The controller is set in front of the right forward front windows, through which the driving engineer has an unobstructed view of the track in front of him. To his right is the valve handle of the air brake, and in front of him is an operating ammeter guaging the current output. The resistances are suspended from beneath the central compartment.

In the test during which the photographs from which our illustrations were made, the equipment of the car consisted of four G. E. 2000 motors—each motor being rated at about 125 horse-power—one motor to each axle, motion being communicated to the wheels through steel gear and pinion. The forward truck was equipped with a special speed recorder. The controller used was a K 16 series parallel controller.

From beneath the bolster of each truck set between the wheels on the conductor rails-side projects a heavy oaken beam, to which is suspended the contact shoe by means of which the current is brought from rails to motors. This shoe is a flat piece of cast-iron with the ends slightly curved. It is fastened by two loose links to an iron casting bolted to the oak beam. This method of suspension keeps the shoe continuously in contact with the surface of the conductor rail as it allows it to conform immediately to any inequalities which may occur in the latter.

The air from the brakes and whistles, one of which is set at each end of the car, is furnished by a vertical direct connected air pump, operated by a motor controlled automatically. This automatic action is brought about by the balancing of the pressure in the air tanks against the power of a spiral spring. The spring is coiled in a cylinder furnished with a piston, the upper end of which is a switch in a magnetic blow-out device. As soon as the pressure in the main tank falls below the desired pounds per square inch, the spring forces up the piston until its upper end is in contact at the switch. Contact being made, the motor circuit is closed and the air pump motor starts. As soon as the pressure rises to normal the piston is forced back, the circuit is broken and the motor stops any arc at the point of rupture of contact being immediately extinguished in the magnetic field of the blow-out device.

The first test made with the motor equipment, the total draw bar pull of which is about 15,000 pounds, consisted in the hauling of three flat New York Central and one flat Lake Shore freight cars each loaded with pigs of iron. This load, about 121 tons dead weight, was easily handled by the locomotive, and the records as to speed and power required showed most gratifying results. The flat cars were then switched back into the works.

The locomotive was then coupled to four New York Central standard passenger coaches making with the motor car a train of 130 tons. The controller was in charge of Chief Engineer W. B. Potter, and S. H. Libby acted as conductor. Several interesting runs were made with this train up and down the track with equally encouraging results.

Our illustration (fig.) of the latter test is made from a snap shot photograph taken as the train was rushing past the first semaphore at a speed of about forty miles an hour. Fig. made with the train at rest shows the construction of the track, the method of laying the conductor rails and the semaphore with its switch-box.

SMELTING IN THE ELECTRIC FURNACE.

According to an article in Le Genie Civil, of Paris, M. Heibling has for some time been engaged in experimenting with the electric furnace, his object being to ascertain how to apply electricity best to the smelting of metallic ores, and especially whether the smelting operation in the electric furnace could not be maintained continuously, as in the blast furnace. He early recognized the fact that the slags resulting from the fusion of the ores were usually poor conductors of electricity, and that their presence in the furnace was very apt to break the electric current and thus put a stop to the operation. He therefore sought to obtain a flux which would be a good conductor, and found that by using a mixture of lime and carbon he could obtain a slag which was a good conductor and would not interrupt the current. Moreover, he found that after separating the metal the slag remaining was not worthless, but was a carbide of calcium, very impure, it is true, but still having some commercial value.

Under the action of the heat of the electric arc a part of the carbon takes up the oxygen in the ore under treatment, while another part combines with the lime and with different contents of the ore, transforming them into carbides, which are fusible and are conductors of electricity. The fused carbides take up and hold the infusible portions of the ore in suspension, while the metal settles in the bottom of the furnace.

In some experiments recently made at Puteaux the mineral treated was chrome-iron ore from Boncau in the Basses-Pyrenees. In treating this without the flux, though a large quantity of electrical energy was expended, he obtained the metal only in the form of irregular strips or ribbons, and these were very brittle breaking up from their own weight. By adding certain proportions of lime and carbon, however, he obtained from the same weight of mineral, with a smaller expenditure of electrical energy, a greater quantity of metal. Moreover, the metal was ferrochrome and was in the form of a compact lump or ingot; while the carbides which formed the slag or residue from the operation gave nearly 250 liters of acetylene per kilogram.

We notice that Byron Jackson of this city has a contract to furnish pumps and machinery for the Rockford, Illinois, Water Works. When a San Francisco firm can take a contract like that, it shows considerable enterprise.

PELTON WHEEL WITH METAL FRAME.

For a number of years past the Pelton Water Wheel Co. has been building up a business in Mexico, Central and South America and Asia, and has had in many instances to meet new conditions. Their success in pushing the business has been largely due to their being able to adapt their machinery to the particular requirements as they come up. The cut shows a Pelton wheel in an iron and steel frame in place of the usual wooden frame. It is designed to meet the conditions obtaining in many portions of Central and South American countries, where the wooden frames are too expensive or unsatisfactory.

BOOK REVIEW.

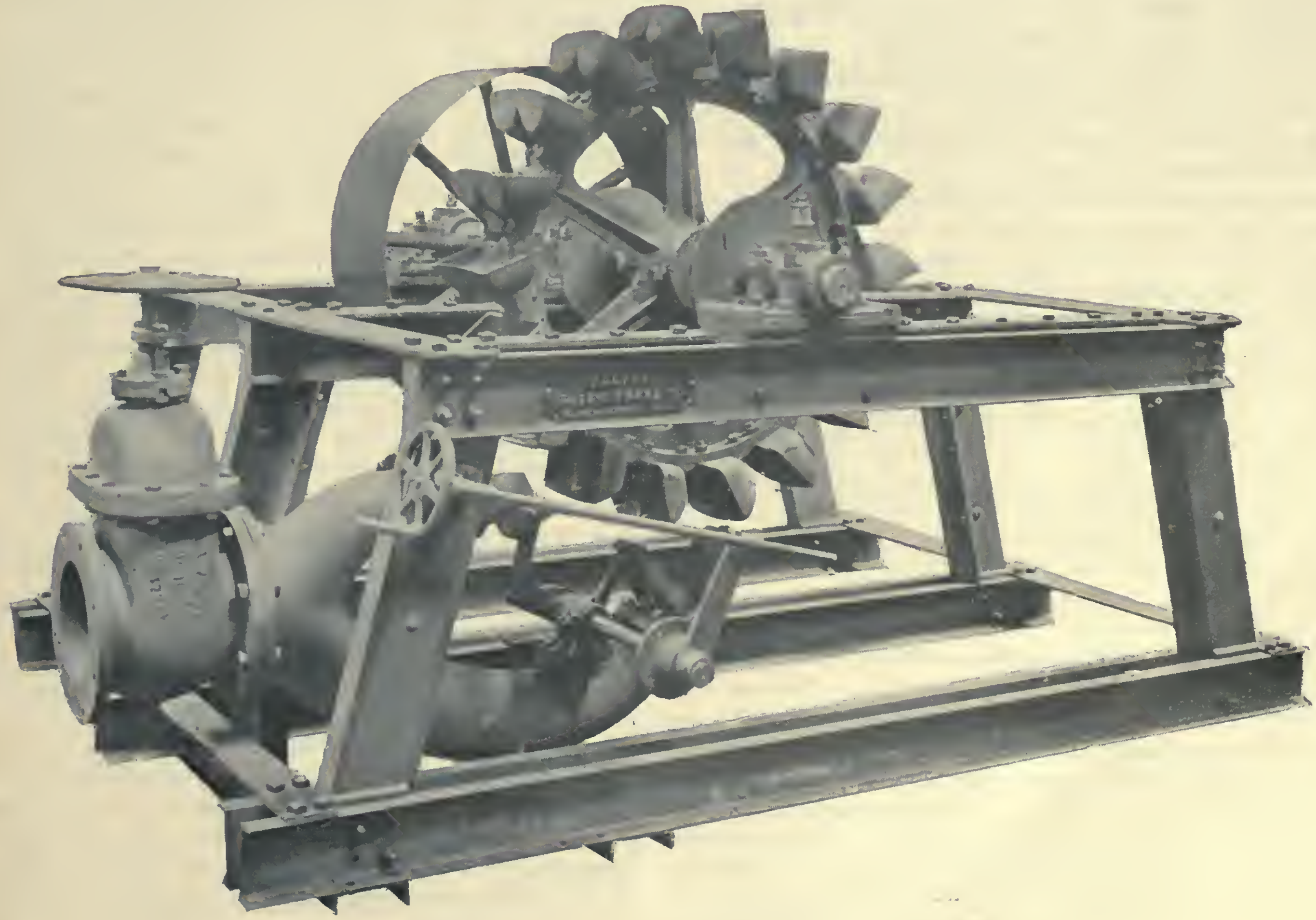
Electricity and Magnetism. By Eric Gerard. Translated from the fourth French edition by R. C. Duncan, New York. The W. J. Johnston Company, 1897; 392 pages. Price $2.50.

Professor Gerard's original work appealed to a large class who were not satisfied with elementary text books, and who, on the other hand, could not master the more abstruse works, such as that of Professor Mascart. The mathematics are as simple as possible, and the language is concise and perspicuous. There are several new chapters added, one by Mr. Steinmetz on "Hystersis," one by Mr. Kennelly on "Impedance," and one by Dr. Cary T. Hutchinson on "Units." The present translation is confined to one volume, but it contains all the distinctive features of the original work, and that which made it valuable above other works on electricity. There was a large amount of descriptive matter in the original that referred almost exclusively to European practice and is not of any great value here, besides which it may be found in other books. This matter has been omitted from the present edition, but the omission does not affect its value to American readers.

Electric Telegraphy. By Edwin J. Houston, Ph. D., and A. E. Kennelly, Sc. D., New York. The W. J. Johnston Company, 253 Broadway, 1897. 448 pages. Price, $1.00.

This is the tenth number of the Elementary Electro-Technical Series, and is written on the same general plan as the others. It differs from the work on the telephone in one point—that there is one chapter devoted to the history of the art. The subject of telegraphy is well covered; all of the ordinary systems, both land and submarine, are described; also the fac-simile and writing systems.

The duplex, quadruplex and multiplex methods are described and illustrated, giving to the beginner a very good idea of that, to him, mysterious process of sending several messages over the same wire simultaneously. Submarine telegraphy, on which subject Mr. Kennelly is a well-known authority, occupies two chapters. There is a map of the world, showing the cable connections and some of the overland connections. The methods of laying and repairing cables are very interesting and instructive, and require as much skill and knowledge as any operations connected with submarine telegraphy. These methods receive their due share of attention.



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Vol. XVIII. MAY, 1897. No. 5

CONSULTING ENGINEERS.

Our spasmodic and hysterical local contemporary published recently an editorial which seemed to have as its principal aim to demonstrate the uselessness of employing consulting engineers in connection with long distance transmission plants and inferentially for any other.

As showing a different point of view, the following extract from an article by Cyrus Robinson on "Modern Mining Machinery," published in the "Engineering Magazine" for April, 1897, is to say the least interesting.

Mr. Robinson was for a number of years engineer for the General Electric Company for their power and mining work, and is now manager of the Ridgway Dynamo and Engine Company.

"It is unfortunate that the consulting engineer is not more used by coal companies considering the installation of a plant, to technically advise as to the purchase. As a rule, the officers of a mining company are not mechanical or electrical experts, and have only a general knowledge of the appliances on the market. At present the engineering work for these plants is done by the representatives of the various manufacturing companies, and, as each is desirous of securing the order, there is a great temptation to recommend a plant made up of the smallest possible units for the work. This is particularly noticeable in regard to the conductors or pipes for transmitting the power. The writer frequently has been astonished to find his competitor for a plant proposing a conductor of about one half the carrying capacity required, stating to the coal company that it was very foolish on the part of anyone to aim at high efficiency in a coal mining power transmission plant, as coal was cheap at a coal mine. It is not the coal alone in this case that should be considered, but the increase in the size of the generating plant made necessary by the proposed excessive loss of power in transmission. In my experience, the average dealer in this class of machinery never thinks of compensating for the great loss in the line by increasing the size of the generating plant; consequently, he is able to offer a cheaper all around plant, and, if he gives a strong enough guarantee, he oftentimes succeeds in capturing the contract. When the plant is installed, it starts under a strain, and in many cases fails to do the work guaranteed; delays, bad feeling, and generally a compromise result, the purchaser having probably lost twice as much by the delay as the services of a competent engineer would have cost him, besides not having a plant adequate for his present requirements, let alone the future.

"When it is considered that the average mining plant for a mine producing one thousand tons of screened coal per day of 10 hours, costs approximately $20,000—this figure covering coal cutting, haulage, and drilling, it seems that the purchaser, for his own protection, ought to secure the services of a competent engineer first to determine the requirements from the conditions at the mine, and later to superintend the installation of the plant."

Mr. Robinson has certainly occupied a position that should give great weight to his statement when compared with that of our contemporary in his autobiographical editorial.

THE BERLINER TELEPHONE PATENT DECISION.

There appears to be considerable misunderstanding as to the effects of the recent decision by the United States Supreme Court in the Berliner patent case.

The suit had been brought by the Government to have the patent declared void on the ground that there had been fraud and collusion in the granting of the patent.

This contention of the Government was not sustained and now the fight comes on the merits of the patent itself.

The Bell Company appears to have taken advantage of technicalities to avoid a decision on the validity of the patent, which is regarded as an evidence of weakness. When the Bell Company attempts to enforce the patent by injunctions, if it does make the attempt, the question will again come up why the application was held up for so many years in the Patent Office to the benefit of the Bell Company? and also why the original specifications were allowed to be amended so as to change the entire character of the patent? And further, what validity there is to a patent upon a device already covered by a previous patent? The independent telephone companies appear to be fairly well intrenched.

Prof. Eliezer Darrow of the State School of Science at Pullman. Wash., has been appointed by the Board of Regents to make a survey of the undeveloped water powers in the State of Washington.

He will commence work in June and should collect considerable information of great value.

A business man has a right to know what he is buying when he places an advertisement in a paper, and yet in nine cases out of ten he is given some fairy tale about circulation. The simplest way to ascertain the circulation of a paper is to ask for the production of the Post Office receipts for postage—it is then a very easy matter to figure of copies mailed.

CRITICISM OF GAS ENGINE MANUFACTURERS.

"Electricity" during the past few months has taken up the cudgels in the endeavor to drive into the heads of gas engine manufacturers of this country a realization of what it calls their lack of business methods in relation to the possibilities that are open to them. The first of the series of editorials which it has published on this subject appeared in the issue of February 24, 1897, and assumed as its text an article reprinted from the "Progressive Age."

The articles in question are clear cut and incisive, and point out with great vigor of language and directness of statement, "the ignorance and apathy, amounting in some cases to the veriest arrogance," which has clogged the development of the application of gas engines to isolated and central station electric light and power plants. They are not written in a spirit of hostility to the gas engine, and the editor is careful to point out the fact that electrical engineers are eager to obtain definite data and information concerning the operation of gas engines, and are looking to them as being along the line of development having the highest degree of possible improvement.

The publication of the earlier articles elicited one anonymous communication practically ignoring the issues raised. This letter "Electricity" comments on with much fairness. and after expressing its honest desire to obtain reliable information concerning the ability to meet the conditions requisite for operating electric generators satisfactorily, closes with the following remark:

"And we wish to say now and here that if any gas engine manufacturer is willing to meet us on the same business basis as does the steam engine, dynamo, motor or compressed air machinery manufacturer, he need have no fear of hostile criticism. Who will do it? Is there one?"

Marked copies of this issue were sent to thirty different gas engne manufacturers, and after two weeks not a single answer had been received.

A communication was, however, received from Prof. Sidney A. Reeve of the Worcester Polytechnic Institute, who is recognized, by the mechanical engineers of this counrty, as one of the highest authorities on the theory of the internal combustion engines that this country has produced.

His remarks on the situation are absolutely startling, and are so pertinent that the following extracts are quoted:

"Allow me to commend your editorial position regarding gas engine builders' methods in this country. The situation is crying for reform. The writer has made systematic efforts to collect from gas engine men a knowledge of their wares with results only most discouraging. . . . . . . There are exceptions to every rule, of course. I have met one, just one, gas engine man who was an engineer, and who knew something of his business—but he was not an American. I believe, however, that there may be at least a half dozen more men within the sacred circle to whom this modified compliment should apply in full force, but not more. . . . . . . The situation is incomprehensible. One illustration will suffice. A warm personal friend of myself and my family has been a gas engine manufacturer for years. Hearing that I was spending time and money in a search for a legitimate gas engine, he took occasion to kindly warn me, from the height of his unengineering, vitiated experience, that 'there was no possible improvement of the gas engine.' The writer cannot yet refute his statement from personal experience, bue he knows that there are a large number of able engineers bent on finding a gas engine as docile, and accomodating as the steam engine, and that no stone will be left unturned until they succeed."

Such an arraignment from such an authority merits more than passing consideration.

Since electric lighting came into the commercial field, the attempt has been made in a number of places to operate generators by gas engines, and the list of failures has been long and alarming. It was but natural to expect that the requirements for driving electric machinery would prove too severe to be met successfully by the earlier forms of gas engines. The fine types of modern high speed, close governing steam engines are the result of the stimulus given by the rapid increase of electric lighting. The gas engine, however, has not similarly responded. The demand exists, but it has not been met. The field for the successful gas engine is practically unlimited. Nelson W. Perry and others have published numerous articles bearing on the advantages to be gained from the use of gas engines, but when an engineer attempts to figure out a practical case, and looks around for a gas engine which he may instal, and on which he may count for continuous, certain, successful, and economical operation, he usually sighs regretfully, and begins to figure on a steam plant.

This is not as it should be. In the smaller sizes, at any rate, some of our local manufacturers have produced engines that have done good work, but the writer has never seen reports on any of these engines, based on the results of tests, which would give an engineer confidence in selecting any one of them for operating an electric plant of any magnitude. Such tests may have been made, but if so, the results have not been given the prominence which their importance would warrant.

In England and on the continent, gas engine builders are very much ahead of what has been done in America. One of the best examples of gas engine driven plant abroad is the corporation plant of the city of Belfast. In this country, the best example is in the electric lighting station at Danbury, Connecticut.

The writer believes that "Electricity" is engaged in a work that can only result in good, and that it deserves the thanks of the entire engineering fraternity of the country.

A. M. HUNT.

The official ticket for officers of the American Institute of Electrical Engineers is as follows: For President, Francis B. Crocker of New York City; for Vice Presidents, A. E. Kennelly of Philadelphia, Pa., Chas. S. Bradley of New York City, Dugald C. Jackson of Madison, Wis.; for Managers, Alexander Macfarlane of South Bethlehem, Pa., Gano S. Dunn of New York City, W. F. C. Hasson of San Francisco, Herbert Laws Webb of New York City; for Treasurer, George A. Hamilton of New York City; for Secretary, Ralph W. Pope of New York City.

STATIC SPARKS.

Lo, the Repentant Sinner Turns!—In a recent number of the "Journal of Electricity," Mr. Low has delivered himself of an editorial that might be termed the "Confessions of An Ex-Would-Be Consulting Engineer."

He says that a consulting engineer of three years or so ago, who assumed to possess knowledge concerning electrical transmissions, was an "arrant imposter," etc., etc., etc.

In February, 1894, which was about three years ago, Mr. Low advertised himself as follows:

GEO. P. LOW,
Consulting Electrical Engineer,
Specialty:
Incandescent Lighting and Wiring. Reports, Plans Specifications and Transmission of Power.
303 California Street, San Francisco.

There was only one other man on the Pacific Coast at that time who advertised that he understood power transmission, and that was a Mr. Gale, who shortly afterwards went East, so it is clear that Mr. Low is referring to himself. Of course, he is the best judge as to whether he was an "arrant imposter," but we think he is exciting himself to much over a small matter. Nobody supposed he knew anything about power transmission then, and his clothing himself in sackcloth and ashes at this late day was hardly necessary.

Perhaps, if his ambition to be a consulting engineer had not died aborning, he might by this time have gained some knowledge of the subject. His farewell to a profession that had parted company from him so long ago seems somewhat belated, but as a wail of woe over past misdeeds, it can be accepted as a sort of repentance after death.

Professor Von Holst of the University of Chicago has been in Europe, where he found a scientist who has made the discovery "that crystals, rocks, pebbles—anything which we have been used to consider as dead things—are in reality organic—that they contain life."

"He says the discovery was made by using magnifying glasses of remarkable strength made especially for the purpose.

"Through these powerful lenses he was enabled to observe that crystals were prescient with life. He selected fourteen different crystals and by the double aid of camera and lens he preserved the visible proof of his theory. He photographed the same crystals at different times the same year, the same month, the same day.

"The views show the crystal in its birth, the head shoving forth from the mother crystal and the course is followed as it is pushed out and away." .

The interesting part of the discovery is that Prof. Von Holst wants five hundred thousand dollars for the inventor to perfect his find and make it of use to the world. Prof. Von Holst is an authority on constitutional history, but he has evidently wandered off his reservation this time; still, a good deal could be done with $500,000.

We judge that this great discovery is not new. Some six years ago, Prof. Keith, in this city, discovered the sexuality of atoms, and he did not ask for $500,000 either.

The American Electrician appears to have abandoned its former wild eyed position that its circulation was larger than that of all other electrical journals in the United States combined and is now endeavoring to draw the "Electrical World" into a competitive circulation contest. We are satisfied that it has a larger paid circulation than the "Electrical World", and for that reason Mr. Johnston will carefully avoid showing his hand.

A deputy sheriff in Marin county announces a brilliant discovery that he has made by which, with the help of a mysterious fluid, he makes a primary battery and produces a wonderful arc light. He is almost ready to do away with dynamos and things and supply the world with light. When the town clerk has experted his invention, in accordance with the custom in dealing with mysterious primary batteries in California, the matter will be on a basis where capitalists can be let in on the ground floor.

A newspaper dispatch from the east to the "Chronicle" gives the world the interesting information that in an ordinary railroad locomotive from five to seven tons of coal "will produce one horse power" while by the use of electricity it will only take two tons. We wonder whether the man who wrote that thought that h. p. was sold by the quart or the yard." In looking at it from another standpoint, if it takes seven tons of coal to "produce one horse power", how much coal will an ocean steamer have to carry whose engines are 10,000 h. p."

The wild ideas that people have about electric power transmission is illustrated in a story in the May number of the Black Cat. An electric motor is described engaged in the work of automatically sinking an artesian well in the Desert of Sahara. An insulated cable laid between the rails of the railroad track furnished the current to operate the motor, and the nearest station where the power plant could be placed was 200 miles away!

James C. Brown has commenced suit in the United States Circuit Court against the Oakland, San Leandro and Haywards Electric Railway Company and asks for $25,000 damages for infringement of patent. Moses G. Cobb, the attorney for Brown, relates in his complaint that Brown was the original inventor of a certain new and useful improvement in the construction of street railroad passenger cars, for which letters patent were issued December, 1886. The complaint recites that the company sued has been using the appliance in making cars for at least a year and a half without paying for the privilege or securing permission from Brown.

The Wright wave motor people in Los Angeles appear to be spending considerable money in the belief that they have a motor that will mote.

THE MORTON-WIMSHURST-HOLTZ INFLUENCE MACHINE.

This machine embodies every modern advance and answers every purpose to which Influence Machines can be put. It is fundamentally of the Wimshurst-Holtz type and is made in two sizes, one having eight revolving plates, each thirty inches in diameter; the other having six revolving plates each twenty-eight inches in diameter, and with a like number of stationary plates.

The revolving plates are fixed to a steel axle, mounted on ball bearings; an eight inch pulley is fixed to the axle and belted to an eighteen-inch driving wheel, and all may be turned without any effort.

The application of the ball-bearing to this form of machine is a new and useful mechanical improvement. By its use friction is reduced to a minimum, and consequently very little power is required to operate the machine.

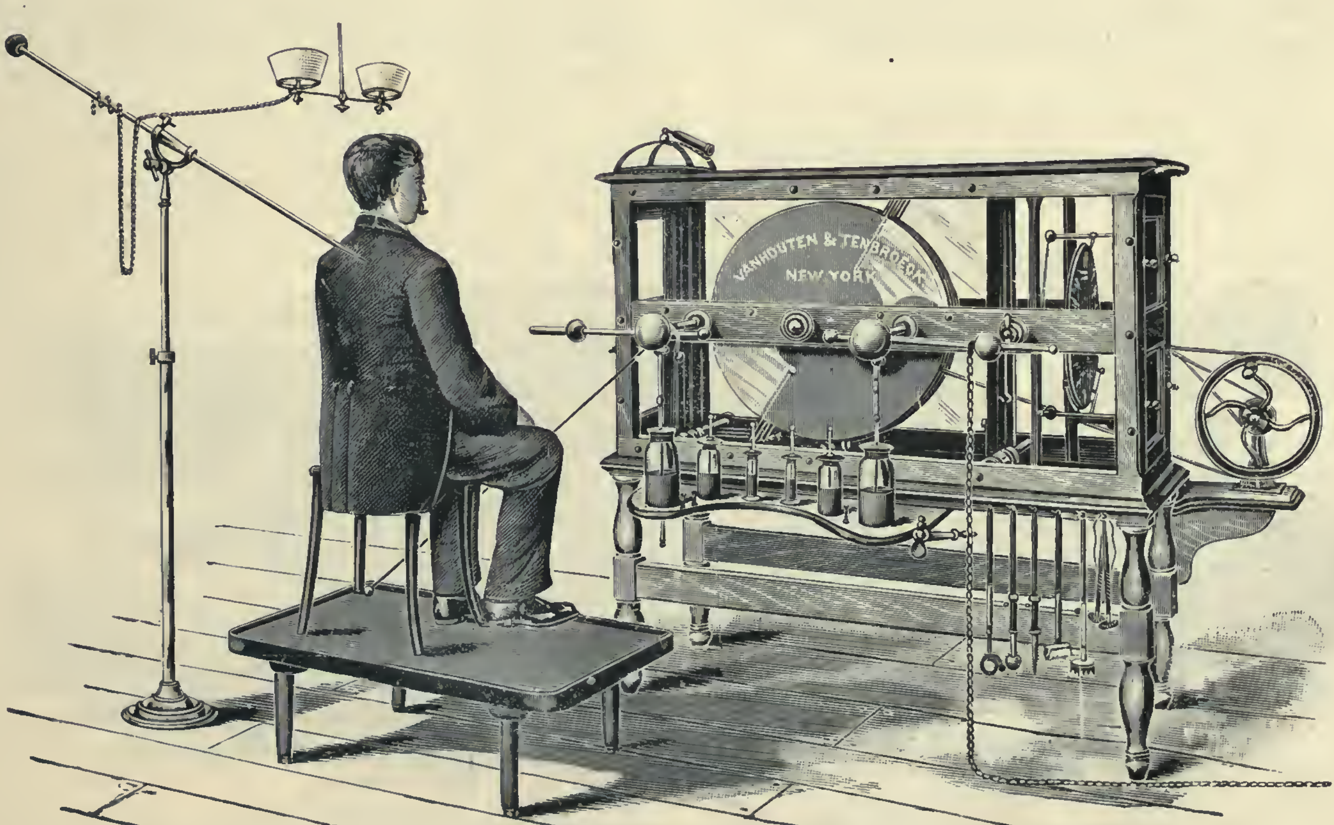
The illustration gives a very clear conception of the appearance of the machine. The small Wimshurst is shown in the right-hand end of the case. This serves as an exciter to charge the large plates, when the latter lose their charge, as is sometimes the case in humid weather. The turn of a handle connects the poles of the Holtz with the Wimshurst and the latter is set in motion by a simple lever movement, a belt connecting the pulleys of the two machines and being operated with the same driving wheel. A few minutes suffice to charge the large machine, when the reverse movements are made and the connection with the Wimshurst broken. The Leyden jars are supported on a shelf, on the under side of which is arranged a simple device for giving the spark, spray and the Morton static induced current: The spark varies in length from nine to fifteen inches.

E. A. Brooke-Ridley, 10 Front street, is the Pacific Coast agent for this machine.

TELEPHONE RELAYS.

(From the London Electrical Review.)

Ever since telephony became a practical science, the idea of a telephone relay has been a favorite problem with numerous inventors. It may be questioned, however, whether these inventors have really grasped what is involved in the problem they have attempted to solve, and whether they have been working in anything more than a haphazard way. Let us consider what are the conditions involved, and whether, as matters stand now, there is any prospect of a successful telephone relay being devised. The conditions are very simple. We speak against a diaphragm on which is arranged a microphone, and this diaphragm vibrates with a certain intensity, an intensity which is perfectly perceptible, and which can be felt if the finger is held against it. The result of this vibration is to produce in the diaphragm of the telephone receiver at the further end of the line an effect which is certainly not perceptible to the touch. In other words,the receiver diaphragm vibrates with much less intensity than does the transmitter diaphragm. How, then, can a microphone arranged on this receiver diaphragm possibly cause a variation sufficient to retransmit or to relay along another section of line equally long, say, with the first one? In order that I may do so, the receiver diaphragm, on which the microphone relay is arranged, must vibrate with the same intensity, or nearly so, as the original transmitter. Unless, therefore, the diaphragm of a receiver can be made to vibrate with an ampitude somewhat approaching that of the transmitter, telephone relaying seems to be impracticable.



The Morton-Wimhurst-Holst Influence Machine.

IMPROVED FORM OF "TRIUMPH" ORE CONCENTRATORS.

The cut illustrates the "Triumph" Concentrator and shows the recent improvements which have been introduced into its construction by which many advantages are gained.

These advantages are obtained by reason of the fact that the crank shaft is now placed and fitted at the head of the Concentrator, clear of the belt, and in direct view of the operator or attendant. This, of course, greatly facilitates the oiling of the bearings of the shaft and connecting rod, and precludes the possibility of any sand or detritus, passing over the belt, from reaching or getting into the bearings.

The forms of the bearings and as well of the connecting rod brasses have also been very much improved, making them stronger, simpler and more easy of adjustment.

Important improvements have also been made in the feed screw and quandrant for regulating the belt, with the view of making all of the parts of the machine stronger, more accessible and as easy of regulation as possible.

These Concentrators are constructed in the best manner; their frames being of iron, insures their solidity, durability and perfect steadiness of motion when operated.

The Endless Belt is carried upon a supplementary frame, which is mounted upon springs. The reciprocating movement which is imparted to this supplementary frame and belt tends to settle and retain the sulphurets and heavy, valuable metallic particles upon the belt, until they are discharged at the proper moment.

The rolls supporting the belt are of galvanized metal, which will neither warp, crack nor rust.

The feeding mechanism is perfect, and permits the travel of the belt to be varied, at will, to any desired speed.

Weight of 4-foot Concentrator (boxed)......2,275 lbs.
Weight of Rubber Belt (boxed), included in above....... .. ..240 lbs.
Weight of heaviest part of 4-foot Concentrator.125 lbs.
Actual floor space required for 4-foot Concentrator, 12' 8" x 7' 3"
Weight of 5-foot Concentrator (boxed) .. ..2,650 lbs.
Weight of Rubber Belt (boxed), included in above.. ....290 lbs.
Weight of heaviest part of 5-foot Concentrator.135 lbs.
Actual floor space required for 5-foot Concentrator, 12' 8" x 8' 3"

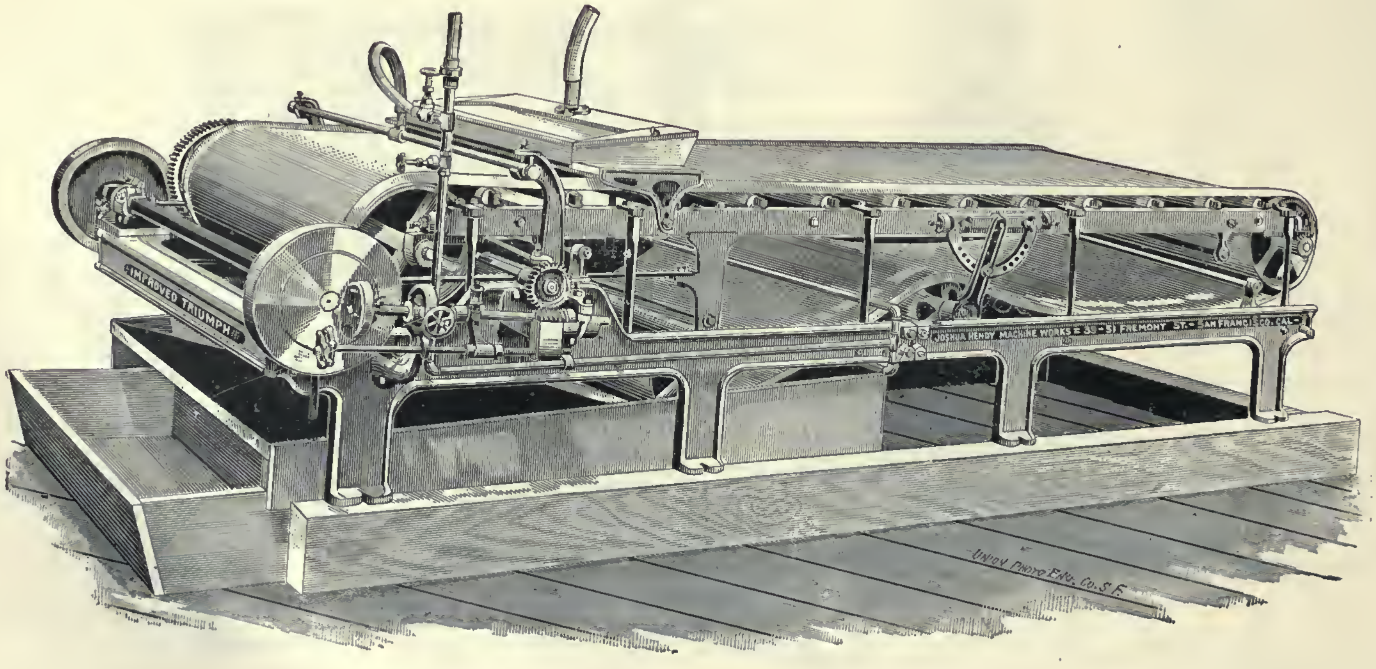
The size of the driving pulley is ten (10) inches diameter and three and one-half (3½) inches face, (tight and loose).

The Joshua Hendy Machine Works, 38 and 44 Fremont street, San Francisco, manufacturers..

Mr. Frank J. Sprague recently secured the contract for the electrical equipment of the South Side Elevated Railroad with a new electrical traction system which is original with him. The contract was awarded notwithstanding the competition of all the prominent concerns who have developed this line of electrical application. The new system is on the same lines as the method experimented with by Mr. Sprague some eight or ten years ago on the New York Elevated Railway, and has been advocated by him ever since. It embodies a distribution of the motors to each individual car of the train, and the control of all motors from one central source.

Mr. Srague was the man who made electric roads a practical and commercial success in this country. His company was absorbed by the Edison, and later became part of the General Electric Company. His return to the field of his former triumphs will be watched with great interest.

The San Francisco Electrical Company, 415 Market street, San Francisco, which holds the agency for the Standard and National telephones, recently took the agency for the Eddy generators and motors. H. P. Thayer is the manager of the company.


IMPROVED TRIUMPH
JOSHUA HENDY MACHINE WORKS = 39-51 FREMONT ST. - SAN FRANCISCO. CAL.
UNION PHOTO ENG. CO. S.F.

Ieproved Triumph Ore Concentrator.

PROGRESS OF ELECTRICAL ENGINEERING IN GERMANY.

From an interesting article in the "Electro-Techniker," by R. Luders, it appears that in Germany within the last 12 months the supply of current to towns for lighting has increased about 20 per cent, as indicated by the number of lamps connected on to the central stations, a percentage increase which means about 150,000 lamps. The combination of lighting with electric traction seems to prove advantageous, and such installations have been pretty extensively carried out. The important reduction in price that follows from longer hours of consumption is illustrated by the tariff of an Upper Silesian installation, where the rate is 1.2 cents per hour up to 400 hours, and half a cent per hour there after. The driving of machine tools by the electric current has been considerably extended, the electric transmission of power on warships has also been very successful.

In the field of railway working a considerable advance has to be noted; the electric curren has been used for shifting points at Berlin-Westend and Untertruckheim stations. According to the reports of the principal firms, the alternate current, and especially polyphase, is fast gaining ground on the continuous current. The latter has been employed in an electric railway at Lugano.

At Dresden five street railway lines are driven with an expenditure of 1,500 horse power; the Hanover-light railways consume 1,500 horse power developed in two power stations, and the extended Budapest street railway consumes 650 horse power. The total length of completed electric railways in Germany is 523 miles, while 512 miles are in course of construction.

On the first of October last year there were in Germany (excluding Bavaria and Wurtemberg) 8,554 heavy current installations at work, 8,160 of which were devoted to lighting purposes, and supplied 1,852,000 incandescent lamps and 79,000 arc lamps, 111 installations were used for electrolytic processes and 618 for power transmission.

In the telegraph engineer's department of the imperial postoffice several scientific investigations have been carried out, for instance, experiments on the spread of strong currents through the ground, and their availability for telegraphy without wires, investigations to determine the best form and material for telegraph lighting conductors and their earth connections, and investigations to discover the best means of protecting telephone, etc., lines from disturbances from leakage in heavy current circuits. In telegraphs and telephones a notable advance is to be seen; at the date cited the net-work of conductors in the German Empire (including Bavaria and Wurtemburg) consisted of about 90,600 miles of line and 130,000 miles of conductor, against 87,500 miles of line and 98,500 miles conductor in the previous year. There are 21,271 telegraph offices, of which 8,591 are provided with telephones. Alarm signals can now be sent from 9,796 stations, whereas in the previous year the number of stations was only 8,441.

Special activity has been exhibited in the building of trunk lines for connecting the telephone installations of different towns. During last year 7,200 miles of conductor have been used for this purpose. There are at present in existence 484 city telephone exchanges and 125,810 telephones for which on an average 1,720,000 connections are made per day. Berlin alone has 82,865 speaking places, for which the daily average number of connections is 450,000, a record which is as yet unsurpassed. The longest telephone line in Germany, between Berlin and Memel, is 600 miles in length.

Representatives of corporations having poles and overhead wires on the streets appeared before the Street Committee of the Supervisors last week in response to an invitation from Mayor Phelan, who is desirous of having the wires placed in underground conduits.

The Edison Light and Power Company was represented by J. B. Crockett and T. B. Bishop. Louis Gloss appeared for the Pacific Telephone and Telegraph Company, P. B. Cornwall represented the Mutual Electric Light Company, L. W. Storror appeared for the Pacific Postal Telegraph Frank Jaynes represented the Western Union Telegraph Company. The Market street Railway was represented by E. P. Vining.

The Mayor informed the representatives of the corporations that the city was anxious to have all wires placed under ground.

The representatives of the corporations expressed their intention of assisting the city in accomplishing this purpose. What they wanted was sufficient time in which to make the change.

Assistant Chief Engineer Dougherty of the Fire Department said an underground system would be of great advantage to the Fire Department. In certain portions of the city it was impossible to use some of the apparatus—especially the water tower—owing of the danger of contact between the water and the electric light wires. Firemen were likely to be thrown from the apparatus in the event of the water forming contact with the wires. When the top of the water tower is in line with the wires the apparatus cannot be used.

P. B. Cornwall said the Mutual Company had placed all its wires in conduits.

L. W. Storor stated that the Pacific Postal Telegraph Company had but one pole of its own—all its wires were on poles leased or borrowed from other corporations.

Supervisor Britt offered a resolution, which was adopted that the representatives of the several companies submit in writing to the board the condition and requirements of their several companies, the time within which they could substitute in the down-town districts the conduit system with such reasonable privileges as they may require.

Almost ever since the need of electrical insulation developed itself, asbestos in one form or another has been prominently known as an excellent agent for this purpose. It has been manufactured into almost every conceivable shape and by a number of different processes, resulting generally in highly useful and valuable products.

It is curious that at this late day a marked improvement in methods of manufacturing asbestos insulation should come to light. It was discovered by Mr. John F. Green, general manager of the Asbestos Insulation Company, Baltimore, Md., that commercial asbestos contained a very large quantity, comparatively, of certain metallic oxides, especially of iron, and that these seriously militated against its insulating properties. After long and arduous experiment, a process was secured for the extraction from the crude asbestos of these oxides, the iron oxides being removed by a magnetic separator. The result is the production of an almost prefectly pure asbestos of highly marked insulating properties as compared with the ordinary commercial variety. This asbestos is manufactured into sheets or papers, using as a basis a paper composed of ordinary vegetable fibre, which is coated on both sides with the asbestos fibre. Sheets of this paper .007 of an inch thick have withstood a tension of 2000 volts, alternating, before rupture. By placing together under great pressure a number of sheets of these papers, boards are made having very highly resistant qualities and possessing great lightness as compared with the ordinary compounds of asbestos and rubber.—Electrical World.

NEWS NOTES

POWER.

Santa Monica, Cal.—E. D. Suits has purchased a 5 h. p. multipolar, 500 volt motor from the General Electric Co.

Colton, Cal.—Wilcox & Rose have purchased four General Electric 20 h. p. motors for a pumping plant.

Portland, Or.—The Portland General Electric Co. has placed an order with the General Electric Co. for a 450 k. w. generator, a rotary converter, a 5000 volt motor and a 3 h. p. volt motor.

Spokane, Wash.—The Washington Water Power Co. has purchased a 5 h. p. 500 volt motor from the General Electric Company.

Riverside, Cal.—The General Electric Co. has sold A. G. Munn & Co. a 2 h. p. motor.

Spokane, Wash.—The General Electric Co. has sold 15 G. E. 800 car equipments to the Spokane Street Ry. Co.

Los Angeles, Cal.—The Palmer Electric Works has purchased a 5 h. p. multipolar motor from the General Electric Co.

Los Angeles, Cal.—The General Electric Co. has sold Julius Hauser a 20 h. p. motor, also one 5 h. p. 500 volt motor.

The General Electric Co. has sold three 5 h. p. hoists to the U. S. Government for the cruiser Baltimore.

Santa Barbara, Cal.—The General Electric Co. has sold a 3 h. p. 500 volt motor to the Santa Barbara Consolidated Electric Ry. Co.

Kingston, N. M.—R. J. Hall of the Black Colt Mine writes that what his district needs is a good smelter to handle the ore. J. B. Prebe, 99 Nassau street, New York City, is interested in the district and it is hoped will put in an electric plant and smelter.

Glendora, Cal.—Crystal Lake Irrigation and Power Company. Directors: D. Dawson, H. G. Baker et al. Capital stock, $250,000. The company is to do a general business in handling water and electrical power.

Wright Wave Motor Co. Capital stock, $1,000,000. Directors: Jefferson Chandler of San Francisco, Parvin Wright, S. C. Ward, Jno. S. Ward and K. W. Midowicz of Los Angeles.

The company has purchased a section of land at Redondo Beach fronting on the ocean, and proposes to establish a manufacturing center, the power to be derived from the Wright wave motor. Electric power is also to be transmitted to Los Angeles.

Los Angeles, Cal.—The contract for the electrical plant for the Southern California Power Company is to be let May 29. The power is to be transmitted 73 miles at a voltage of 30,000.

Rossland, Cal.—A. W. Morris has purchased mining property in the Ainsworth Mining Division and proposes installing an electric light and power plant.

Fresno, Cal.—It is proposed to operate the big raisin seeding plant by electricity.

Los Angeles, Cal.—The Los Angeles County Supervisors have granted to W. G. Kerckhoff a franchise for a pole line for transmission of electric power from the San Gabriel Canyon to Los Angeles.

Colton, Cal.—The East Riverside Irrigation Company is having an electric pumping plant installed four miles west of Colton at the company's wells. Two 20 h. p. motors will be put in.

Twin Lakes, Colorado.—G. V. Bode, superintendent of the Buckskin, Grant and Mt. Gold Mining, Tunnel and Power Company writes us as follows: "We have got our electric machinery all in and ready for running the power drills at full capacity. We have put in the C. & C. dynamo and motor. The dynamo is run by a 5-foot wheel. We have a flume 30 inches square and 1250 feet long, with a 350-foot pipe line from flume to wheel, the pipe line 24 inches at flume entrance and reduces to 2½ in. nozel with 87½ ft. fall. We get 250 h. p., which is transmitted from dynamo to motor, a distance 2½ miles by wire to the tunnel, where we have a large single cylinder Rand compressor capable of running one of the largest Engersal drills at a distance of 3,500 feet, which will be running at full blast by May 1st. We have run the tunnel 200 feet this inter. This tunnel is run to cut 17 known veins which assay from ½ to 50 ounces of gold per ton, which is free milling." He reports the mining outlook at Twin Lakes as very promising for the development of a lively district.

We have received catalogue of Corliss engines and tubular boilers manufactured by the Murray Iron Works Co., Burlington, Iowa. A number of their engines are in use on the Pacific Coast.

San Francisco.—The Fort Wayne Electric Corporation has sold a one h. p. single phase motor to Bibo, Neuman & Ikenberg.

Sausalito, Cal.—The Sausalito Electric Light Company has purchased 20 Duncan wattmeters from the Fort Wayne Electric Corporation.

San Francisco.—The Fort Wayne Electric Corporation has sold a single phase A. C. motor to the California Market.

Sacramento, Cal.—Chas. Suter has ordered a 40 h. p. motor from the Fort Wayne Electric Corporation.

San Francisco.—The Fort Wayne Electric Corporation has sold a 5 h. p. and two 1¼ h. p. motors to the Evening Bulletin.

San Francisco.—Wm. Cronan has purchased a 5 h. p. motor from the Fort Wayne Electric Corporation.

Los Angeles, Cal.—The San Gabriel Electric Power Co. has been granted a franchise for its line in Los Angeles. It bid $760.

Los Angeles, Cal.—The Crystal Lake Power Co. has retained W. H. Saunders as electrical engineer.

Los Angeles, Cal.—There is talk of the consolidation of the San Gabriel and Santa Ana electric power projects. The promoters of the Santa Ana plant have purchased the Pasadena Electric Light and Power Co.

Missoula, Mon.—E. L. Schafner, president of the Gold Coin Mining Co., with officers at Chicago, proposes installing a large electric plant to operate 40-stamp mill, etc.

Moro, Or.—The Moro Observer states that an electric power plant is to be installed soon.

Capt. Ward, who has been working for over a year on a proposed power transmission plant for Coulterville and vicinity, has about completed his negotiations with capitalists, and work is soon to begin on the plant.

San Francisco, Cal.—Bay City Electric Light & Power Company, Louis De Rome, H. C. Knowles, et al.

San Francisco—The Westinghouse Electric & Mfg. Co. received from Geo. H. Tay & Co. and order for a 2½ h. p. motor.

Willows, Cal.—The Willows Power Co. is to be incorporated shortly to construct a power plant at Stony Creek.

San Francisco.—The California Rattan Works has purchased a $2\frac{1}{2}$ h. p. Westinghouse motor.

San Francisco.—The Westinghouse Co. has sold a 10 h. p. motor to the Union Iron Works.

Ely, Nevada.—The Chainman group of mines has passed into the control of Chas. D. Lane and others of San Francisco, and it is proposed to put in a large plant operated by electric power.

Mexico.—J. Geo. Gardiner, of Vallejo, Berkeley and Redwood City notoriety, appears to have landed on his feet in Mexico.

He has written to a friend that he is sort of general manager for a power transmission plant to operate a group of mines 60 miles from the City of Mexico.

It is a 13-mile transmission, 1,500 horse power.

Ashland, Or.—The Ashland Consolidated Mining Co. has purchased from the General Electric Company one 30, one 20 and one 10 h. p. motors.

The Mining and Engineering Journal says: "A process for recovering gold from ores is being exploited by some influential South African men, of whom Mr. Paddon and Mr. Tudhope, of the Johannesburg Consolidated Investment Co., are the chief. Dr. Keith, the inventor, is an American electrician, who has for several years been connected with the Sandycroft Foundry in England. The process consists of two parts, that may be separately considered: First, the process for dissolving the gold out of the crushed ore, and second, the recovery of the gold from the solution. Dr. Keith's improvement in the dissolving process consists in adding to the solution of potassium cyanide a certain amount of cyanide of mercury. In practice he states that he finds that the best results are obtained when the solvent contains 0.05 per cent of potassium cyanide and 0.025 per cent cyanide of mercury. This mixture of cyanides, it is claimed, operates very much faster than the simple potassium cyanide. At present we have no exact figures relating to the rate of solution, but experiments on a practical scale are now being made and will be available shortly.

The process for the recovery of the gold from the solution is an electrolytic one. The gold and the mercury are deposited together upon amalgamated copper plates. The amalgam so deposited is scraped off and the gold recovered by distilling off the mercury in the usual way. The anode is not allowed to dip into the cyanide solution, but is placed in a separate compartment and surrounded with a solution of an alkaline salt, so that the cyanide does not become decomposed. The electro-motive force of the current need not be more than $\frac{1}{2}$ volt and the current density on the depositing surface may be as low as 0.06 ampere per square foot."

Mr. Keith is well known in San Francisco and vicinity; he appears to have discarded his former, self-assumed title of Professor and has now blossomed out as "Dr. Keith."

He was a man of considerable ingenuity, and an unusually good poker player, and we trust he will make a stake out of the influential South African capitalists.

The General Electric Company has secured offices in the Claus Spreckels building, and will move as soon as the building is completed.

A warehouse will be secured adjoining the railroad, where the stock will be carried and from which shipments can be made.

O. N. Jantz, electrical engineer of the Bullock Electrical Company of Cincinnati, Ohio, has been in San Francisco for some weeks. He expects to place an agency here shortly.

RAILROADS.

Santa Barbara, Cal.—The Santa Barbara Consolidated Electric Railway Co. has placed an order for two Westinghouse car equipments.

Los Angeles, Cal.—The franchise for electric road on San Pedro street was awarded to J. C. Lynch of Cucamonga.

Los Angeles, Cal.—E. P. Clark has been granted a franchise for an electric road. Jas. C. Kays has also been granted an electric road franchise.

Santa Monica, Cal.—An electric road is talked of between Dedondo and Santa Monica. F. G. Ryan is interested.

San Diego, Cal.—Jos. Flint has accepted the position of manager of the San Diego Electric Railway Co.

San Francisco.—The directors of the Market-street Railway have had plans prepared for the reconstruction of the two steam roads which run on either side of the Park. It is proposed to change both the California and H street roads into trolley lines.

The California-street dummy line starts from Central avenue and California street, and runs out the latter thoroughfare through Richmond to the City Cemetery, and thence by way of Baker's Beach to the Cliff House. The railroad company secured a permit to use steam as a motive power for a period of eleven years. The time will expire the first of next year.

The H-street steam road runs south of the Park through the Sunset district from Stanyan street to the ocean beach.

The electric system on California street may include a part of the cable lines now operated on Jackson, Washington, Sacramento and Central avenue. The electric system will be extended over these streets as far east as Fillmore street. The cable lines will then make Fillmore street their westerly terminus, and run between that point and the ferries with the cable on Powell street.

Nevada City, Cal.—The Electric Power Company is considering the question of building an electric railway from Grass Valley to Nevada City, Cal.

Copley, Cal.—An electric line is to be built connecting the Garlick power plant at Copley, Cal., with the National mine and mill at Old Diggings, three and a half miles, being the third mining plant in that district to be run by electric power from Copley, ten miles from Redding.

The Dalles, Or.—It is reported that an electric road, 20 miles long, is to be built from The Dalles to the free bridge on the Deschutes.

Los Angeles, Cal.—W. H. Hock, who held an electric road franchise, has been granted an extension of time to October, 1897, in which to have his line in operation.

Victoria, B. C.—The Tramway Company contemplate extensions of their line from Granville street along Hastings, Burrard, Georgia streets, to Park; from Robson street along Dynman to the beach; from Grangeville street along Pender street to Park. The company has asked for a five years' franchise for those extensions, with right to continue until city purchases the line.

Seattle, Wash.—The General Electric Co. has sold two G. E. 1000 equipments to the Seattle & Rainer Electric Ry. Co.

Sealed proposals the being invited until June 8 for furnishing a quantity of electrical supplies for the Twelfth Lighthouse District. Specifications and blank forms of proposals may be obtained upon application to Major C. E. Davis, San Francisco, Cal.

LIGHTING

Prosser, Cal.—The Westinghouse Co. has sold a lighting plant to E. W. Hopkins.

Mr. Scribner of the Westinghouse Co. has again sold that "inevitable carload of converters." This time to the Central California Electrical Co.

Guerneville, Cal.—The Westinghouse Company has sold two 15 k. w. machines for a central station plant.

The Trinity Mining Company has purchased a lighting plant from the Westinghouse Co.

The Westinghouse Co. has sold a15 k. w. generator and 15 k. w. motor to Mrs. Hearst for furnishing light and power on one of her ranches.

Sacramento, Cal.—The Westinghouse Company has sold a 60-light separately excited arc machine, direct connected, to Tesla motor, to the Central California Electrical Co.

Spokane, Wash.—The Edison Illuminating Company has purchased a 250 k. w. monocyclic machine from the General Electric Company, also one 200 k. w. multipolar D. C. machine.

Portland, Or.—Geo. W. Symonds has order a 60 k. w. 500 volt Edison machine from the General Electric Co.

San Jose, Cal.—The Santa Clara County Supervisors have received a petition from Edwin Fish, secretary of the Peninsula Lighting Company for a franchise for 50 years to erect and operate an electric line for lighting and power from Palo Alto to San Jose along the Embacadero, S. F. and San Jose roads; also through streets in Mayfield and Mountain View.

Boise, Idaho.—The Idaho Central Construction Company has been formed with $250,000 capital stock to construct electric plants.

Fullerton, Cal.—Money is being raised to put in an electric lighting plant.

Yreka, Cal.—An electric lighting plant of 20 lights capacity is to be installed in J. H. Wadsworth ice pant.

Slocan, B. C.—A. L. Casson of the Northwest Fixture Co., Seattle, proposes installing an electric lighting plant. Power will be developed at the Springer Creek rapids.

Butte, Mon.—The Butte General Electric Co. will extend its system.

Los Angeles, Cal.—A franchise has been granted to the Home Telephone Co. for $111.

Folsom, Cal.—Some time since, Isaac Hyman was granted a temporary franchise for furnishing the town of Folsom with light and heat by electricity; he has now secured a 25-year franchise under the terms of which he will, after five years, pay the county 3 per cent of the gross earnings.

Bandon, Or.—The Bandon Light and Power Company has been formed with $5000 capital stock.

Sierraville, Cal.—L. L. Batchley proposes putting in an electric lighting plant at Sierraville. The power will be derived from a water wheel plant at Etta.

Arroyo Grande, Cal.—An electric lighting plant is proposed for Arroyo Grande.

Seattle, Wash.—The Seattle Gas and Electric Light Co. will expend $50,000 in improving and enlarging its lighting system.

Yale, Or.—An electric lighting plant is to be built in Yale.

San Francisco.—The Fort Wayne Electric Corporation has sold to Goldberg & Twedie one 5 h. p. motor and one 1½ h. p. motor.

San Francisco.—Kepp & Dun have purchased a 1 h. p. single phase A. C. Fort Wayne motor.

Mr. F. N. Delanoy, the good looking treasurer of the Fort Wayne Electric Corporation in this city, has closed a marriage contract with Miss Powell of Alameda.
We understand that there was great competition for the order, as Miss Powell was one of the most charming of the young ladies across the bay, but Mr. Delanoy won without any cutting of prices, on account of general superiority.

Tombstone, Arizona.—It is reported that A. Ashman is proposing to put in a gas and electric plant at the big copper camp.

Myrtle Point, Or.—The people of Myrtle Point are considering the matter of installing an electric lighting plant and water works.

Tombstone, Arizona.—The Detroit Copper Company will construct a gravity and electric road down the mountain from the mine.

Dunsmuir, Cal.—L. Van Fossen will put in water works, from which power is to be developed for running an electric light plant and other machinery.

Phoenix, Arizona.—F. S. Aspinwall, it is reported, will put in an electric light plant.

Nelson, B. C.—The Nelson Electric Light Co. will increase its plant.

Astoria, Or.—The West Shore Mills Co. has offered to increase its lighting plant and furnish the city with 60 lights for $350 per month, instead of $660 as formerly. This proposition was submitted in view of the proposed city plant.

Vacaville, Cal.—The Vacaville Electric Light and Water Co. propose enlarging the electric plant.

Ukiah, Cal.—C. B. Johnson, through his attorney, George A. Sturtevant, has applied to Judge J. M. Mannon of the Superior Court for a perpetual injunction restraining the Board of Trustees of Ukiah from granting a franchise to the Mendocino County Electric Company to conduct a lighting system. The plaintiff is proprietor of the Ukiah Electric Company his contention is that the advertisement of the Mendocino company is illegal. Judge Mannon granted a temporary injunction.

San Francisco.—The General Electric Company has sold for the Claus Spreckles building three 100 kw. dc. machines. The contract for the boilers of this plant went to the Babcock & Wilcox Co. and Risdon Iron Works secured the engine.

Ashcroft, B. C.—The Horse Fly Gold Mining Company has purchased a No. 4 Fort Wayne arc machine, lamps, Pelton wheel, etc.

Kingman, Arizona.—The Excelsior Mining Co. has purchased a 7½ kw., 125 volt lighting plant from the General Electric Co.

Sausalito, Cal.—The Fort Wayne Electric Corporation reports the sale of a "carload of converters" to the Sausalito Electric Light Company.

According to the News, Santa Barbara is now considering a proposition from an Eastern company to furnish it with a municipal electric light plant of a capacity of 162,000 candle-power for the sum of $48,000. This is a curious item and evidently somebody has gone astray.

Visalia, Cal.—D. L. Wishan proposes constructing a six-mile telephone line.

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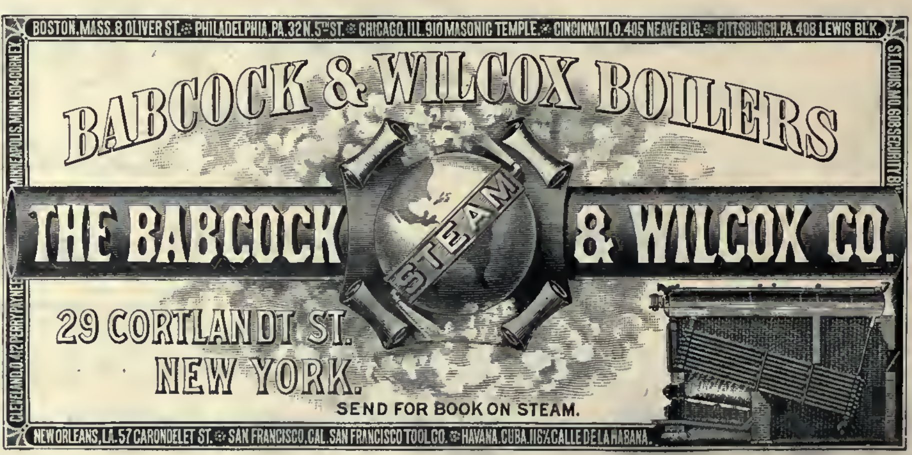

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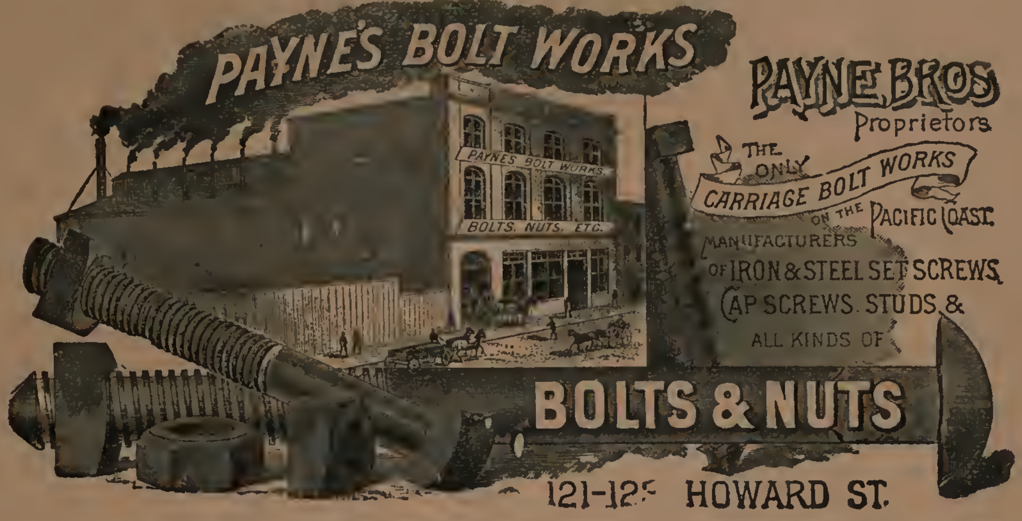
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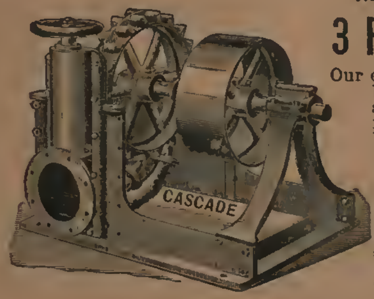

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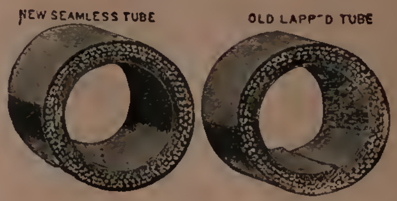

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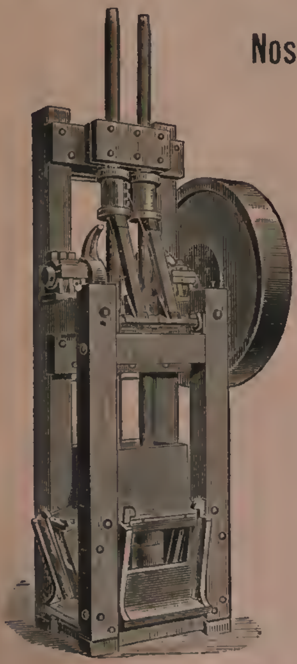

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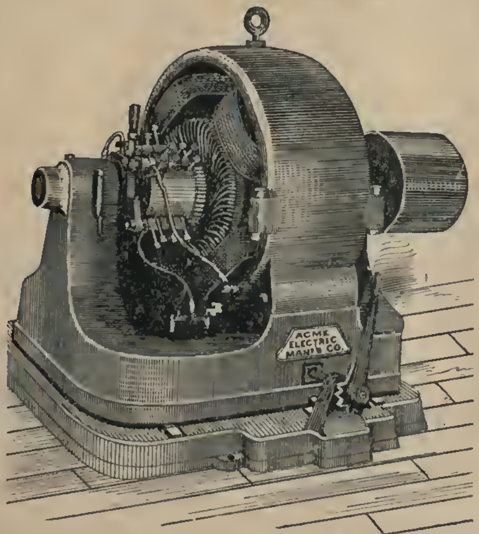
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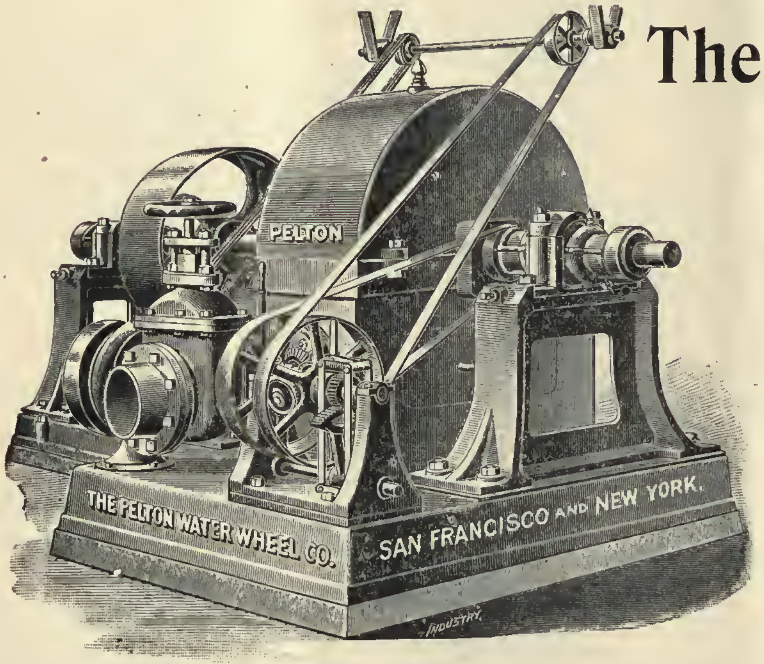
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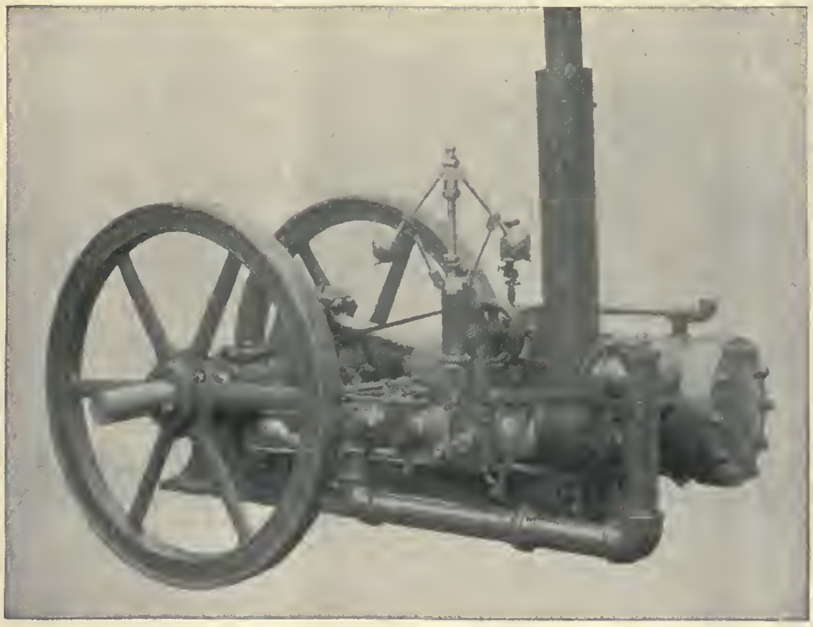

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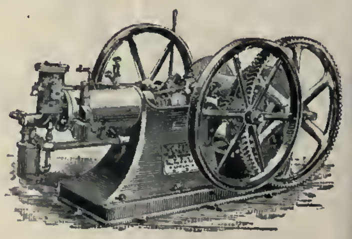


...THE...

PACIFIC ELECTRICIAN

VOL. XVIII. JUNE, 1897 No. 6

THIRD RAIL SYSTEM FOR ELECTRIC ROADS.

The New York, New Haven and Hartford Railway directorate has made another advance in the application of electricity in the operation of its road, in the electrical equipment of its line running from Berlin to New Britain on the New Haven system, Hartford Division and from New Britain to Hartford, on the New England System, Springfield Division.

The first electric car was officially run over the electrically equipped track on the 11th inst., by Col. N. H. Heft, the Chief of the Electrical Department of the N. Y., N. H. & H. R. R., in the presence of the President, C. P. Clark, Vice-Presidents Hall and Mellen, the directors and other prominent officials of the New Haven and New England systems.

The importance of this step can hardly be gauged. Unlike the experiments at Nantasket and East Weymouth, this length of the newly equipped lines gives it an appearance of permanence, which removes it from the region of new experiments, and while it is still difficult to predict with any assurance of immediate realization, the supersession of the steam locomotive, the successful operation of this line from the point of view both of electrical efficiency, and financial economy will go far towards hastening the day when the steam locomotive will eventually be relegated to the limbo of half remembered tho' faithful servants.

This section is the longest section of any railroad in the world, hitherto exclusively operated by steam locomotives, to be equipped for electric traction. The total distance is 12.3 miles divided in two parts, the first running from the power house at Berlin, the second extending from New Britain to Hartford. The road from Berlin to New Britain is single track; from New Britain to Hartford double track, the east-bound track only being devoted to electric service.

TRAIN.—ONE MOTOR CAR AND ONE PASSENGER COACH.

In the operation of this road the electric trains will run from Berlin to New Britain and back. The trains from New Britain to Hartford and back running as a separate service, the change of cars being made at New Britain.

This important system differs in its electrical equipment from that at Nantasket in that the the trolley system of contact is not used.

That adopted is the third rail system, the conductor or third rail being laid along the centre of the track between the running rails.

The power station of the New York, New Haven and Hartford Railroad is No. 3, that at Nantasket being No. 1, No. 2 being the power station at Stamford, Conn., from which the local trolley line is supplied with current. Power station No. 3 is a brick and stone building, two stories high, divided by a central wall into two parts—boiler room and engine room. In its present condition it forms only about half of what the station will ultimately be. The north side is closed in by boards. At what will be the centre of the front wall of the completed building is a bay in which the switchboard is erected. The present length of the building is 113 feet 3 inches, its depth exclusive of the bay, 102 feet 5 inches, and height to ridge pole 65 feet. It is divided by a 26 inch brick wall into two parts, the front part facing the railroad is the engine room. The rear contains the boiler equipment.

850 K. W. Dynamo, Direct Connected to 1200 H. P. Engine.

The boilers are ten in number each of 300 horse power. They are tubular boilers built by E. Kendall & Sons, Cambridgeport, Mass., and are set in two batteries of five each. In the construction of the boiler-front a new method, devised by Col. N. H. Heft, Chief of the Electrical Department of the Consolidated road, who has carried out the en the electrical installation, is followed. The entire boiler front is capable of being taken down without disturbing the rest of the boiler setting, the front being bolted to a plate attached to the dividing wall instead of to the wall itself. This innovation will be readily appreciated.

There are two feed water pumps, either pump being capable of supplying water to both batteries at once. The piping from the boilers is in duplicate and will be covered with non-conductive covering. The flues enter a brick stack 125 feet high, located immediately in the rear of the center of the present building. The coal used is known as locomotive sparks, the burning of which has given considerable satisfaction at the Stamford station. The coal is taken directly from the trucks in the rear of the station and is emptied into a large bin running along the back of the building.

The engine section of the building is divided into two stories, the upper one of which will contain the engines and dynamos. It is lighted by windows both in front and at the side, and is very high, spacious and well ventilated. One engine is in place, the foundations are in for another, and a third will be added as soon as demand warrants.

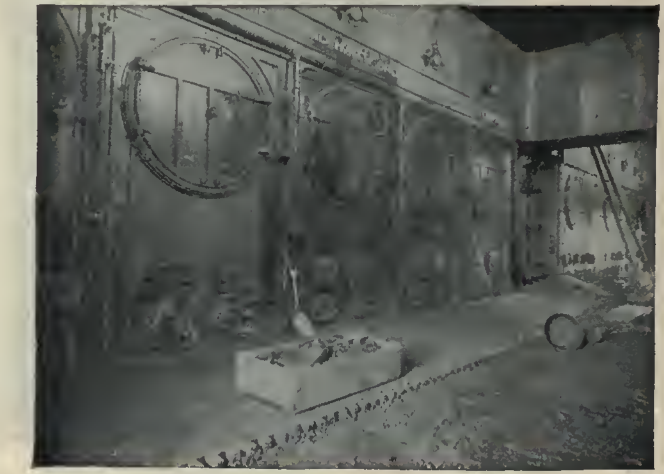
The projected extension of the building will hold three more, and as each engine will have a capacity of 1200 H. P., the total capacity of the station when completed will be 7200 H. P., nominal, which can readily be raised to 12,000 H. P. The engine at present in position is a Greene-Corliss improved cross-compound, condensing, built by the Providence Steam Engine Co. It is rated at 1200 H. P., nominal with dimensions 28 x 48 x 48 x 4 feet stroke, running at 100 revolutions per minute.

To the engines is directly connected a General Electric Co., standad 10 pole 850 Kilowatt generator of the iron clad type, with the method of construction of which our readers are familiar. The dynamos are over compounded and furnish current at 600 volts, no load, and 650 volts full load. The switchboard in the bay is of the G. E. standard panel type, built up of seven panels, four of which are at present blank. Of the three equipped, two are generating panels while the third is a totalizing panel. The first two carry automatic circuit breakers with magnetic blow-out, ammeter and the usual generator panel equipment, the totalizing panel carries a form G Thomson recording wattmeter showing the total output from the generators. A traveller with two cranes, one of 35 tons, the other of 5 tons capacity runs the length of the engine room. It was built by the Berlin Iron Bridge Company, which furnished the steel roof trusses.

From the switchboard run four cables each of 850,000 circular mils cross-section to the third rail.

The third rail is similar in shape and weight to that used on the stretch of track between East Weymouth and Nantasket Junction on the South Shore Branch of the Plymouth Division of the N. Y., N. H. & H. R. R. In cross section it resembles a flattened "A" and weighs 93 lbs. to the yard. It is laid up in blocks of wood impregnated with insulating material. The blocks are only about one-half as high as those used at East Weymouth, allowing 1⅝ inches from the eave of the third rail to the tie, and in some places only 1½ inches. This reduction in the height of the insulating block is due to the fact that no greater height could be allowed in view of the height of the service rails.

The top of the third rail is about 1 inch higher than the level of the tops of the running rails. The conductors are bonded, not by the ordinary leaf or stranded copper bond but by plates of sheet copper ⅛ inch thick, 12 inches long and 4½ inches wide. These are fastened to the underside of the third rail joints by means of a drop-forged iron angle-plate bolted by 16 bolts, 8 for each copper plate, on each side of the third rail joint, the nuts being outside the rail. Each bond has a capacity of about 900,000 circular mils. The total bond at each joint having about twice the carrying capacity of the rail itself, while its measured resistance is less than equal length of the 93 lb. third rail. One of the most striking facts in this installation is the absence of feeders, entire dependence being placed on the carrying capacity of the well-bonded rail.



View of Boiler Room.

On the Berlin branch are four grade crossings. On the New Britain and Hartford line 18. At all of these crossings the third rail is omitted, the circuit being continued underground by stranded bare copper cables of 500,000 circular mils and in some cases 850,000 circular mils. These cables are first drawn into creosoted wooden conduits filled with an insulating material made of residuum and asphalt. They are then laid in creosoted wooden troughs in turn filled with the same compound and then boxed over and buried. The broken ends of the third rail are fitted with wooden inclines or approach blocks to allow the shoe to rise upon the rail without danger of catching and breaking.

The motor equipment will consist at first of five motor cars. These are open cars 50 feet in length used last season at Nantasket but deprived of the trolley. Each car weighs about 32 tons. Each is equipped with two G. E. 2,000 motors and two "L" series parallel controllers. The car cut-out is a K Automatic circuit breaker fixed beneath the hood. Each motor car is fitted with air brakes, two gongs and a chime whistle.

SWITCHBOARD.

Air for the brakes and whistle is furnished by a vertical double cylinder air pump driven by a motor automatically controlled by a special switch which is opened when the pressure in the main tank reaches 90 lbs. and closed when it falls below that.

Contact is made with the third rail by means of sliding shoes. These are of cast iron 12 inches long and 4 inches wide weighing about 20 lbs. They are suspended by two links from a casting fastened to a beam set immediately beneath the King pin of each truck, connection between motor and shoes being made by flexible cables. The distance between the two shoes is about 33 feet.

Many of the grade crossings are wider than this and to avoid carrying the train over the crossing by momentum another shoe is fitted to each truck of the second car of the train, a connection running from this shoe to the motors. Thus, by the time the last shoe has left the third rail at one end the first shoe is in contact with the next section of the rail.

The question of the safety of the public was not the least important which demanded the attention of the officials of the New Haven road. In order to protect it from its own foolishness or absence of mind, the greatest precautions are taken. At Berlin and Hartford stations, the third rail section is fenced in on both sides. At New Britain, where the lines of the New Haven and New England systems converge, in addition to the fence, a method which almost amounts to interlocking is adopted. In the "Y" formed at the convergence of the roads is the switchman's tower. From the section of the rail entering the station cables run underground to a switchboard in the tower, for which the third rail may be connected to or disconnected from the circuit. As the train comes to a stop in the station, the third rail is cut-out, and is not thrown into circuit again until the outgoing train is ready to start. The chance of accidents is thus reduced to a minimum.

The McCloud River Railroad Company, recently incorporated in this city by William E. Brown, William W. Van Arsdel, Daniel W. Earl, J. Dalzell Brown and George W. Scott, will soon begin active construction work. The company intends to build forty miles of road as an extension to the twenty miles of road already built from Upton, Siskiyou county, a station on the Southern Pacific two miles north of Sissons, to McCloud, a small lumber town on the river of the same name. At the latter place people interested in the road have a lumber mill in operation with a daily capacity of 200,000 feet. The proposed extension, according to W. W. Van Arsdale, one of the directors, will commence at McCloud and run west and south to Fall River, a small town in Shasta county. It will be a broad-gauge line, in the very heart of the wild scenery of the Mount Shasta country, and, when completed, will be open for regular railroad business and travel. The construction of some portions of the road will be quite expensive, but its projectors think it will be a good investment, as it will open up and develop a big section of Siskiyou and Shasta counties now remote from rail communication.

TRUCK OF MOTOR CAR WITH TWO G. E. 2000 MOTORS.

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POWER FOR LOS ANGELES.

Last week contracts were let in this city for what is, in many ways, the greatest electrical power transmission ever undertaken.

The amount of power transmitted is only about 4000 horse power, but the distance from the power house to the distributing station will be 81 miles, which is over twice as far as any transmission line now in operation.

The current will be transmitted at a pressure of 33,000 volts, the highest voltage hitherto used, 15,000, being on the lines of the Central California Electric Company, from Newcastle to Sacramento.

The electrical equipment will be furnished by the General Electric and the Westinghouse Companies.

The Southern California Power Company, which is putting in the plant, controls most of the available water powers in the vicinity of Los Angeles, and from advices received from Southern California, it is evident will shortly absorb the San Gabriel plant, upon which work is now being done, and thus practically control the electrical field in the Southern part of the State.

The shareholders in the company have recently secured control also of the Los Angeles and Pasadena Railway Co., the Los Angeles and Santa Monica Railway Company, the Pasadena Electric Light and Power Co., and the West Side Lighting Co. of Los Angeles. The operation of a transmission line of such great length, and the use of current at such a high voltage, will be watched with great interest, for it is likely that difficultes will arise that will tax the ingenuity of the electrical engineers.

New conditions will have to be met and troubles solved, for as a matter of fact nobody knows just what will happen in the practical operation of such a transmission line. It may be that everything will work like a charm from the start, but it is well known that as the voltage is raised the electrical effects change and at present no one can say just what will take place in the transmisson of a current of such high voltage.

The history of electrical engineering in this country, however, warrants us in believing that the difficulties will be successfully met.

DANGERS OF ACETYLENE GAS.

There is a great deal of wild talk afloat as to the wonderful virtues of acetylene gas, much of which is entirely untrustworthy.

Whatever its future may be, it is certain that at the present time the use of acetylene gas under pressure is extremely dangerous.

In Germany, its use is prohibited on account of its explosive character, and a few months ago a chemist in Beriln, while endeavoring to demonstrate that it could be used without danger, was blown up and killed, together with three of his assistants.

Recently in Paris at the Pictet Works, where acetylene is compressed in steel cylinders tested to 250 atmospheres, there was an explosion of one of the cylinders that wrecked part of the works and blew two men to pieces.

At Lyons, France, a few months ago, an explosion occurred in a cafe lighted by acetylene generated on the premises, that killed two persons.

In January a cylinder of acetylene blew up in New Haven, killing three persons and wounding four others.

It is evident that when used under pressure it is extremely dangerous and should not be allowed, so far as the general public is concerned.

When generated on the premises at atmospheric pressure it is also dangerous unless strict precautions are observed to prevent explosion by the admixture of air.

It may be all very well for chemists and those who understand the risk they run to experiment with acetylene gas, but the ordinary man had better get his light in some other way for the present.

The fact that the General Electric Company has entered into a contract to build generators of the inductor type for the Souther California Power Co. plant is worthy of note as showing the change that has taken place recently in regard to the favor in which the induction machines are held.

The Stanley Company introduced them and made a single-handed fight for them.

A few months ago the Westinghouse Company began building them and now the General Electric has taken them up.

The Stanley Company deserves the credit of having developed the type of machine and of having forced the other companies into line.

While most of the power transmission plants in California have proven good paying investments, the Folsom plant appears to have got into deep water.

It has been an open secret for some months past that the company has been pressed for ready money, and it is now understood that a reorganization in the interest of the bondholders is pending.

THIRD RAIL ELECTRIC ROADS.

The third rail system for electric traction, as it is being worked out on the lines of the New York, New Haven and Hartford railroads, probably marks the beginning of the end of steam railroads.

It is, of course, hardly out of the experimental stage, but enough has been done to show that the right way has been found.

It has the advantage, even in its present partially developed condition, of greater speed, greater adaptibility to the requirements for passenger traffic and almost certain reduced cost of operating expenses.

We are certain that the adoption of this system for all suburban lines, where the passenger traffic is the great source of revenue, will be very rapid. Then will follow lines between the large cities where the passenger traffic is large and the distances not too long.

An electric line between New York and Chicago, operated at a high rate of speed and possessing all the advantages that make for the comfort of travelers, would control the cream of the passenger traffic as soon as it was in operation, and the other lines would be forced to adopt electric traction.

One of the most striking facts in the history of the industrial development of this country is the readiness and rapidity with which improvements are taken up and put into operation.

Ten years ago the first successful street railroad was put into operation in Richmond, Va., and within half a dozen years practically the entire horse car service of the country was done away with, and in addition there was an enormous extension of street railroads far beyond what was possible under the old order of things.

Four years ago long distance electric power transmission began and since then, during a period of unexampled industrial depression, millions of dollars have been expended, and to-day we are in the midst of the movement that is rapidly revolutionizing the power conditions of the country.

We are on the eve of a similar change in steam railroad traffic and when the movement once gets fairly started, we believe it will be as rapid as we have seen it in street railroads.

Another big power transmission plant has been started to furnish power for the mines in Tuolumne county. The contract for the electrical equipment will be let in a few days.

The transmission line will be sixteen miles long, and 6000 horse power will be generated.

The Rawhide mine, the Tuolumne County Electric Light and Power Co., and some half a dozen mines in the vicinity, are putting up the money for the plant and will use the power.

There are several other projected power transmission plants in the State for which contracts will be let in the next few months.

In the development of electrical power transmission California leads all the other States of the Union.

An item was last month published in a local paper to the effect that the Mariposa Electric Power Co., was already engaged in the erection of an immense dam to develop water power for its transmission plant.

As a matter of fact only a little preliminary work has been done to hold the water right.

The promotors are endeavoring to interest capitalists in the project, and the matter is at present being looked into by English capitalists.

If the promotors could secure a number of long-term contracts with the various mines near Coulterville, for furnishing power there would be no trouble to raise the necessary capital. It is however, a risky thing to go ahead without the signed contracts. This was clearly shown in the case of the Nevada County Power Co., which has so far been unable to sell much, if any, power to mines, and depends for its profits upon the sale of lights in Grass Valley and Nevada City. As it is that company is earning enough to pay the interest on its bonds and operating expenses and have a fair surplus left over.

If it was not for the lighting, however, it would have before this been forced into bankruptcy and fallen into the hands of the mine owners at a nominal figure.

LOW PRICES FOR GENERATORS.

It is interesting to note that at the recent letting of the contracts for electrical machinery for the Southern California Power Transmission plant, the prices went to a point never before reached. The General Electric Co. offered to furnish, set up complete with exciters, four 750 k. w. induction tpye generators, for $37,500.

A few years ago such a price would have been impossible.

When generators can be sold at between six and seven cents a pound, it certainly marks an era in the development of the manufacture of electrical apparatus in the United States that ought to enable this country to control the electrical work of the world.

E. A. Rix has sold out his business, and proposes shortly to start again furnishing machinery for both compressed air and electricity.

Mr. R. B. Elder has been asked to take the agency for storage batteries by several different companies and is considering whether he will accept one of the propositions.

Business has been very quiet in the electrical field the past few weeks; but, the outlook for the future is good, as there have been more enquiries and more estimates called for than ever before.

We understand that the Fort Wayne Electric Corporation expect soon to be in the field with multiphase apparatus for all purposes.

The electrical power transmission men on the Pacific coast have formed a mutual protective association and we will give the details of the organization in our next issue.

STATIC SPARKS.

The Man with a Strain.—We notice in various Eastern electrical journals the following statement, which bears internal evidence of having been writter by Mr. Hawley himself:

"Mr. Frank W. Hawley, chairman of the committee to receive and entertain Governor Morton at the opening of the Electrical Exposition last year, and whose energetic efforts in connection with the gun firing and the sending of messages around the world contributed so largely to the success of the exposition, has arrived in the city from California. Mr. Hawley says that San Francisco is still talking of the excitement produced on that occasion, and also says that there is a strong feeling in that city in favor of an electrical exposition there next year."

The excitement produced in San Francisco by Mr. Hawley's recent presence was undoubtedly very great. It may of course have been merely a coincidence, but numerous burn-outs were reported on the power circuits in the lower part of the city, and the rates for incandescent lighting in the vicinity of the Parrott building dropped to such a low point that the lights on the General Keyes plant wires grew dim with dismay, while the operating expenses of Bouvier and Allan St. John rose to an unheardof figure in their efforts to keep their coppers cool. One well-known electrician swore off, several others lost their jobs and the "Journal of Electricity" brought out another number. In the midst of all this wild excitement and turmoil, that modest violet, the Hon. Frank W. Hawley, spent his entire time in rushing from one newspaper office to another in a frantic effort to secure the publication of his picture with the statement that he was the man who, almost single-handed, had established the great Niagara Falls power transmission plant and had thereby suffered a severe strain from which he was endeavoring to recuperate.

It is understood out here that the reason why an effort was recently made in New York to prohibit the publication of portraits in the papers was in order to protect the daily journals from the solicitations of Mr. Hawley. There is no chance of an Electrical Exposition in San Francisco unless Mr. Hawley will promise to stay away, and we trust that the next time the great electrical engineer and inventor feels his strain coming on he will go somewhere else and not come out here to upset the electrical equilibrium of the Pacific Coast.

News comes from the Tesla Laboratory that the great inventor has finally solved the problem of transmitting telegraphic messages a distance of twenty miles without the use of wires, and is now preparing to make instruments that will enable him to communicate with all parts of the earth with ease and dispatch. He says he does the business with his oscillator, but the details are not explained. If Mr. Tesla is reported correctly, then we must accept what he says he has done as true. At the same time his outline of what will be done in the future appears somewhat wild. For example, he is quoted as follows in regard to his ability to communicate over unlimited distances: "If I have a machine which will throw a stone from here to there," continued Mr. Tesla, pointing from the floor at his feet to the door of his laboratory, "then I do not need to doubt that I can make one which will throw the stone fifty miles if I can control the necessary power."

He might as truly have said: "If I can jump four feet, then I do not doubt I can jump a thousand miles, if I can get strong enough."

The difficulty of communicating over great distances may not increase with the distance, as it would in his illustration, but if it does, then the dfficulty of making hismachine will be rather great.

Again he says: "Have a machine at each commercial or political center and send out from each place, under an international agreement, all the political, financial or other news, to be read at every other part of the world at the same moment. The news could be distributed over wire lines or otherwise. Financial panics and even wars might be done away with if this were done."

We have rather speedy means of communication at present and yet wars and panics do not show any tendency to cease, and it is difficult to see how Tesla's invention would change things. We fear the great inventor is growing wild in his ideas.

Again, his suggestion of the transmission of power without the aid of wires appears, at the present stage, a little previous.

Dr. Jordan of Stanford University proposes taking to Alaska an electrical branding outfit in order to brand the seals that he runs across. The machine was invented by Instructor Farmer and has been tested on the University cats, with satisfactory results to the inventor, although the cats are said to have been somewhat displeased.

We understand that Dr. Jordan will take four embryo electrical engineers from the University with him in order to operate the Farmer machine. Two will turn the handle and the others will hold the seal.

If the Government decides to brand all its seals, it will open a new field for electrical engineers, and the electrical engineering department of Stanford will doubtless be crowded with applicants.

Jack Magner, the deputy constable over in San Rafael who astonished the Call with his alleged invention of a wonderful primary battery, is attracting attention in the East. The Electrical Review thus refers to him: "Here it is again. A California inventor has discovered an electrolyte for battery purposes which does the business. Of course, he proposes to do away with dynamos, and is only waiting till he reduces the cost of making the fluid used in his battery. O tempora, O mores!"

The Electrical Engineer, in commenting on the fact that the San Francisco and San Mateo Electric Railway Co. gives prizes to its employes for efficient work, heads the item up as follows: "Prices for San Francisco Motormen."

Electricity says that when Frank W. Hawley begins to talk, people take to the woods.

May 27th, 1897.

Editor "Pacific Electrician:"

As there are people who question the necessity of employing a consulting electrical engineer in connection with electrical power transmission and electric light plants, I will state my experience in two of many cases, where plants have been installed without the aid of a consulting engineer.

From my experience, I consider that people contemplating installing a plant, large or small, will find it to their interest to employ a consulting electrical engineer, as their charges are generally in proportion to the size of the plant and do not exceed the cost of repairs and expense caused by not having a properly equipped plant.

One case I will mention of a party in this city who decided to have a plant installed in his establishment. He asked for bids; the bids varied considerably, and mentioned appliances that he did not understand; he selected the lowest bid, which read somewhat like this: "I will in your establishment install an electric light plant, capable of lighting —— 16-C. P. Lamps, for the sum of —— Dollars.

When the plant was installed and put in operation, the owner was well pleased with the light, which I must say was very bright, considering the mains registered only 118 volts and the lamps were rated 100 volts. The result was, he had to purchase new lamps in a very short time and was cautioned not to carry the pressure above 100 volts. He was compelled to purchase a volt meter and rheostat to control his dynamo.

In another case where I was sent for, I found the dynamo sparking badly, the lights were very poor and the engineer in charge informed me that the dynamo had been running in that condition for some time. I discovered that one of the workmen had tied a lamp to a gas fixture, the base of the lamp making good contact, grounding the negative side of the circuit to the fixture; on further inspection I found another lamp on the third floor of the building tied to the gas fixture in the same manner with the socket grounded to the wire on the positive side, making complete circuit through the gas pipe. When tested with an ampere meter, registered 37.5 amperes at 105 volts pressure, showing a loss of 105x37.5—746 : : 5.28 h. p. for several months.

Had there been a ground detector or an ampere meter on the switch-board the engineer would have discovered the difficulty and rectified it at once.

I deem it necessary to mention these cases, as they are only two of many of the same type.

L. ROYLANCE,
525 Mission St., San Francisco.

New York, May 20, 1897.

"Pacific Electrician," San Francisco, Cal.

Gentlemen—We beg to inform you that the firm of Sugden, Pound & Wagner of London (former selling agents for Magnolia Metal in Europe and who traded under the name of the Magnolia Anti-Friction Metal Co. of Great Britain by special permission of our company) have been dispossessed of their agency by the English Courts and that our London Office and our foreign business are now under the management of Mr. Chas. B. Miller, the president of this Company.

We beg also to inform you that Messrs. Sugden, Pound & Wagner were recently perpetually enjoined, together with the Atlas Metal Co., Limited, of London, John Sugden, Max Wagner, Arthur George Brown, The Globe Engineering Co., Ltd., of Manchester, the Atlas Bronze Co., Limited, and the Atlas Bronze Co., from continuing the fraudulent business of making an anti-friction metal and branding it with the trade-mark of the Magnolia Metal Co. of New York, imitating their ingots, marking the boxes in which the metal is packed, "Made in the United States," and otherwise deceiving and imposing upon purchasers of anti-friction metal in Great Britain and Europe.

Justice Collins heard this case and gave judgment against Sugden, Wagner, Brown, The Globe Engineering Co., Ltd., and others for selling counterfeit goods and deceiving the public by representing that the goods they sold were made in the United States by the Magnolia Metal Co.

An appeal was taken from the injunction above referred to. This appeal was tried before the Court of Appeals, Lord Esher presiding, and the perpetual injunction granted by Justice Collins was confirmed. It was in this trial that Lord Esher denounced the action of the parties above named and characterized their performance as "A Disgusting Fraud."

It has come to our notice that parties in this country have attempted to perpetrate a similar fraud, and we now have one Western firm in the courts over this matter, and we desire through your columns to warn the engineers and the general public, users of anti-friction metal, against these fraudulent attempts to pirate and appropriate the use of our trade-marks and name of our metal.

Every bar of Magnolia Metal bears the steel stamp of the Magnolia flower and the impression of the steel die "Patented June 3rd, 1890," and "Manufactured in the United States" with the exception of the metal manufactured by this Company in Russia, which bears the stamp of the Magnolia flower and the words "Manufactured in Russia."

Will you kindly publish this letter and help in that way to give publicity to the facts set forth and thereby protect, in some measure, American manufacturers who are being wronged by foreign as well as domestic competitors?

We remain, dear sirs,

Yours very truly,
MAGNOLIA METAL CO.
E. C. Miller, Vice President.

Auto-Cars, Cars, Tramcars, and Small Cars. By D. Farman, M. I. E. E. Translated from the French by Lucien Serrallier, with preface by Baron de Zuyler de Nyevelt. 112 illustrations. Whittaker & Co., London; The Macmillan Co., New York, 1896. 249 pages. Price, $1.50.

To engineers desirous of learning what has been accomplished in developing the construction and use of self-propelling vehicles, the whole of this book will certainly be of value.

To the layman the latter part, treating of the subject from an historical and descriptive standpoint, will be of interest.

The first chapter treats, by the aid of higher mathematics and the calculus, of the expansion of gases and the work done by this expansion. Part of this chapter is devoted to the mechanics of traction and car resistance.

The third chapter deals with the theory of the various types of motors employed for this work, these being steam, gas, petroleum and electric.

The next five chapters are devoted to the description of cars propelled by different forms of the above-mentioned motors, and furnish to the non-technical reader the most interesting and valuable portion of the book. Many cuts add interest to this part. The last chapter deals with some of the minor details in connection with this work, such as lubrication, tires, axles, carbureters, ignition and vibration.

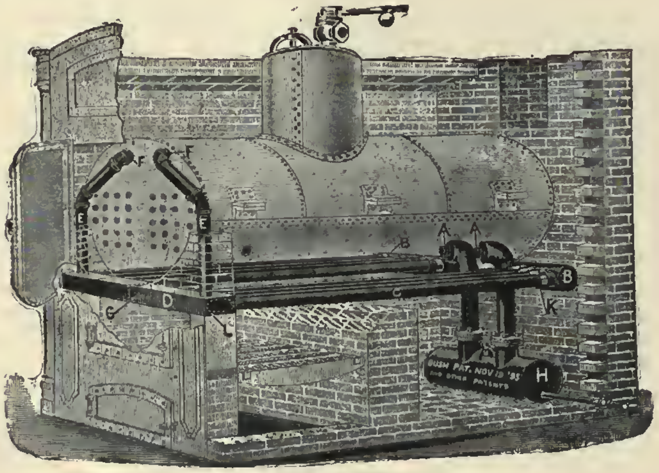
The report of the result of the Paris-Marseilles race of September, 1896, and the report of the commission on the cars entered for the Chicago "Times-Herald" race are included.

The book ends with an excellent index.

AN IMPROVED STEAM GENERATOR.

The demands of modern practice require quick, economical and efficient generation of steam in steam boilers, and to attain these results various devices and improvements have been produced. One of the most noteworthy of these is the Hascall Steam Generator, which is shown in the accompanying illustration. This generator, it is stated, effects a great saving in the use of fuel and produces a drier and more commercially profitable quality of steam than can be obtained by any other means, and at the same time absolutely prevents the formation of scale or sediment in the boiler, thus adding to the life of the same.

The generator is simple in its construction and principle of operation, and presents no change of conditions to the engineer as regards firing or running the boiler to which it may be applied.



Hascall Steam Generator.

It is accessible at all times without disturbing the boiler setting, and the parts can be readily taken out, examined and replaced.

In attaching the generator, the rear head of the boiler is tapped and connections made with close nipples at A A, which communicate with back headers B B. Expansion joints, K, permit the tubes to expand and contract freely without injury in any way to the boiler connections. The tubes, C, are screwed at the front into the water box, or arch, D, which is shown divided by a partition as shown by the dotted line at G. The front riser tubes, EE, extend from the ends of the water box and enter the front head above the fire tubes and water level at F F.

Circulation of water commences as soon as the fire is started, entering from the lower portion of the boiler into the generator at A A and passing through the back headers, B B, thence forward through the tubes, C, which are immediately over the fire, into the water arch, D, and up the risers, E E, discharging at F F into the steam space of the boiler. This circulation is constant and extremely rapid, and always in the same direction, viz., from the lowest point at the back end of the boiler to a point just above the water line in the front head. Such sediment as may be contained in the water tends to precipitate as soon as the temperature reaches the boiling point, and is carried in at A A by the rapidly flowing current, and, being of a greater specific gravity than water, continues on its downward course to mud drum, H, while the water turns to right or left, flowing through the piping as already described.

Thus, after heat has precipitated the foreign matter contained in the water, it is removed and isolated by reason of the very rapid circulation and gravity, and the boiler and the generator remain perfectly clean and free from scale. In fact, every point of the interior of the generator and boiler is thoroughly washed by the rapid circulation of the water.

In boilers where incrustation has already become a serious obstacle, the attachment of the generator, it is claimed, will remove the incrustation and absolutely prevent any further accumulation.

The generator is constructed of high grade material throughout and to meet all requirements of service for which it is designed, and is approved and insured by the representative boiler insurance companies.

From data at hand covering an extensive use of the Hascall steam generator, it appears that the steaming of a boiler is in every instance very much improved where the generator is attached (usually one-half less time than formerly being used to get up steam); that there is no difficulty in keeping steam at the pressure desired; that the saving in fuel ranges from 10 to 30 per cent., or, using the same quantity of fuel as formerly, the capacity of the boiler is increased in the same proportion.

This generator is manufactured solely by the Hascall Steam Generator Company, 66 Broadway, New York City.

THE GAS ENGINE IN CENTRAL STATIONS.

There was a time when a bold writer might have undertaken to lay down the lines on which the central electric distributing station of the future would be laid out; but recent developments, it seems, have brought to light certain facts that may well cause the most sanguine speculator on the future of electrical generation to pause before venturing to express a positive opinion on that subject. For some time past not a few able engineers have expressed the belief that the steam engine would in time give way to the internal combustion or gas engine, and we are bound to confess that that opinion was shared by us, and for that matter is still unshaken, but one's faith gets a rude shock from some recent experiences recorded in England with stations in which gas engines have been used exclusively. To be specific, it seems that at Coatbridge, England, a station has after fifteen months' operation with gas engines, abandoned the latter in favor of steam. As this is a matter touching directly all stations now employing gas engines, and those contemplating their employment, it seems worth while to enter a little more deeply into the causes which have led to this radical step. The machinery of the Coatbridge station comprised three generating sets, each consisting of a 120-horse-power engine rope-geared to a 50-kilowatt Mordey alternator. The gas engines were double acting, two cylinder, side-by-side type, working on the Otto cycle at 185 revolutions per minute. The governing of the engines was by graded charge down to one-third of full power, below which explosions were missed. Each engine shaft carried three fly-wheels, and the system was arranged for the alternators to be run in parallel. Fuel gas was generated from anthracite coal, in generators resembling the Dowson type. We give these details in order that our readers may be familiar with the conditions existing in this particular installation. This plant was run from March, 1894, until the end of June, 1895, the load on the station being so small as to obviate the engines being run very often with the alternators in parallel. When the alternators were run in parallel, however, it is said that the result was not altogether satisfactory.

At the beginning of July, 1895, the gas plant was abandoned and three vertical steam engines were installed in their stead. The results of the cost of operating the station during these two periods is illustrated in the accompanying table.

A comparison of costs of working of Coatbridge Electric Supply Station running by gas power and by steam power.

	1894	1895	1896
Period of steam engine running		July to Dec.	Jan. to Dec.
Period of gas engine running	April to Dec.	Jan. to June	
Units generated	25,800	51,000	59,600
Cost of fuel	£205	£305	£212 8s. 4d.
Cost of fuel per ton, for gas	18s.	18s.	
Cost of fuel per ton, for steam		4 s. 6 d.	4s. 6d.
Cost of oil, waste, stores, etc.	£130	£160	£84
Salaries and wages at station	£375*	£482	£500
Salaries and wages at mains	£182	£142	£106
Net loss on year's working	£1,000 (9 months)	£451	£663
Cost of fuel, per unit generated	2.545d.	1.435d.	0.855d.
Cost of oil, waste and stores per unit generated	1.25d.	0.753d.	0.338d.
Salaries and wages at station per unit generated	3.50d.*	2.27d.	2.03d.
Net loss per unit generated	9.6d.	6.88d.	2.67d.

It will be noted that only nine months of gas engine work is given, but this is probably sufficient to enable a fair comparison to be made. It will be apparent also that the year of 1895 is a composite period, the first half representing gas practice and the latter half steam practice. Inasmuch, however, as it represents results of lighting intermediate between the other two sets of results, it tends to confirm the conclusion that the introduction of steam has effected an improvement in the financial results. In making comparisons between these figures it must not be overlooked that the output of the station was much lower in 1894 than in subsequent years, thus rendering the comparison unfair to gas. The managers believe on the other hand that not a little of the improvement in output of the station is due to the greater confidence consumers have acquired since it has been run by steam. Taking the figures as they stand, however, perhaps the most striking fact brought out in the table is that the gas engines cost much more for fuel than a steam plant. This apparently inexplicable condition is well acounted for by the fact that the anthracite coal required for the gas generators cost 18s. per ton, whereas the boilers are at present fed with local slack, costing 4s. 6d. per ton; and as a matter of fact in 1894 with gas, only 26.4 pound of coal was used per unit generated, whereas in 1896 with steam 35.3 pounds were required. It will thus be seen that the present steam plant which is working non-condensing, consumes nearly 33 per cent. more fuel than the abandoned gas engine. We may remark here, that if by the unit is meant as usual the Board of Trade unit, the kilowatt hour, the consumption of fuel in either case appears to us to be out of all proportion, indeed almost inexplicable considering the high class machinery employed.

The item next in importance to that of fuel, perhaps, is lubrication, which, it will be noted, amounted to 2½ cents per kilowatt hour, an apparently heavy indictment against the gas engine. This amount, it will be noted, includes, besides lubricating oil, the cost of ignition tubes and material for gas scrubbers. In 1895 no less than $5.10 per week was being paid for ignition tubes alone, four new tubes being used in each engine every day. The lubricating oil was not filtered nor used again, so that the expense on this score might have been reduced. Indeed, it is estimated that the best present gas engine practice would enable the cost of lubrication to be reduced to nearly one-third of that given in the above table. There are, however, other reasons which may have led to the resumption of steam in the Coatbridge station, which are not apparent from an inspection of the accompanying table. Among these may be irregularity of speed, imperfection of working at reduced loads, difficulty in starting, and noisiness. Our contemporary, the London "Electrician," to whose columns we are indebted for the facts above enumerated, remarks that the Coatbridge station is now a much less noisy station than it was during the gas engine days. Perhaps the most serious objection, however, to the gas engine arises from its behavior at light loads, for the fact remains, as proved by experience, that even governing by a graduated charge of fuel and air and working on the Otto cycle the consumption of fuel rises at an extremely rapid rate as the load falls off. On the other hand if miss-fire governing is employed, no regularity of speed can be maintained, at least for the requirements of electric lighting, and especially when alternators are run in parallel.

Besides the abandonment of gas engines at Coatbridge similar plants at Morecambe and at Belfast are shortly to be changed over to steam also. In Belfast, we may add as an extenuating circumstance, that the gas employed although made from cheap bituminous coal, was obtained from the local gas company, who, of course, made a profit out of it before delivering it to the electric light company. We have thought it worth while to go into these details, as it bears directly upon a question of vital importance to central station managers. We must confess that, apparently damaging to the gas engine as the showing is, we are not prepared to consider the evidence presented as at all final or conclusive. The relative efficiencies of a gas and a steam engine are well known, and while we are aware that the mere item of fuel is not the only one to be considered in estimating the working efficiency of a plant, still the experience at Coatbridge is not one which we deem to be that of a truly typical case. But even admitting the defects as well established, are engineers to assume that the gas engine is incapable of improvements to meet the conditions imposed in electrical station work? We have full faith in the ability of gas engine manufacturers to overcome whatever difficulties may have been the cause of the dismal experience above noted. Of course, we may be confronted by the argument that gas engine building is by no means a new industry, and that it is to be fairly assumed that the gas engines installed at Coatbridge represented the best current practice; but even if such were the case, that would not alter the argument, since improvements are constantly being made even on the best standard apparatus of the day, and the gas engine has been the particular study of some of the best engineers of the day. It would be a matter of general interest to analyze the results of experiments in the United States with the operation of electric generators by gas engines, and we hope those who have had experience with them will come forward with the results they have obtained.—Electrical Engineer.

The Bradford Investment Company lent $25,000 to Behrend Joost, and in the contract that was made by the parties it was agreed that fifty bonds of the San Francisco and San Mateo Railway Company should be held by the company as security for the amount loaned. There was also a provision that if the bonds deteriorated in value that Joost would decrease the amount of the debt or increase the securities. The notes were not paid and the company brought suit to foreclose. The answer of the defendant, Joost, contained the statement that there was a subsequent agreement that he would not personally be held for a deficiency. Upon motion of the plaintiff the Court granted the prayer of the complaint and a deficiency judgment was ordered against Joost. Upon appeal the Supreme Court holds that it was the right of Joost to prove the subsequent agreement, if made in writing, and orders the cause back for a rehearing.

San Francisco, Cal.—The General Electric Co. has sold to the San Francisco and San Mateo Electric Railway Co. 26 railway controllers.

NEWS NOTES

POWER.

Phoenix, Ariz.—S. Powell proposes putting in an electric power plant at Powells Camp.

Riverside, Cal.—The General Electric Co. has sold a 3 h. p. 110 volt motor to L. V. Brown.

San Francisco, Cal—The Evening Bulletin has purchased a 20 h. p. Westinghouse motor.

Fresno, Cal.—The Westinghouse Co. has sold a 3 h. p. A. C. motor to Fresno parties.

The Westinghouse Co. has sold a 3 h. p. motor and a 5 h. p. generator to the Big Creek Power Co.

San Francisco, Cal.—The Pacific Power Company has purchased from the General Electric Company 3, 8 and 15 horse power motors.

Santa Monica, Cal.—The General Electric has sold a 10 h. p. 500 volt motor to the City Water Works.

Spokane, Wash.—The General Electric Co. has sold to the Washington Water Power Co. a 15 h. p. motor.

Hilo, Hawaiian Islands.—The Hilo Mercantile Co. has purchased a 15 h. p. 110 volt motor from the General Electric Co.

Watsonville, Cal.—The Western Beet Sugar Company has purchased two 30 h. p. multiphase motors from the General Electric Co.

Bakersfield, Cal.—The Power Development Company has purchased a 15 h. p. 110 volt motor from the General Electric Co.

Los Angeles, Cal.—The General Electric Co. has sold a 3 h. p. 500 volt motor to Mrs. Geo. Stoneman.

Santa Monica, Cal.—An electric pumping apparatus will soon be in operation at another well on the other side of the hill. The apparatus came from San Francisco. Power for the motor will be transmitted from the line of the Pasadena & Pacific Signal.

Perris, Cal.—Prof. Baldwin and H. A. Plimpton will inspect the water power at Old Baldy, with a view of running a wire to Perris. If this should be accomplished, electricity will be used for raising water and driving the machinery.

Seattle, Wash.—Preparations are being made for establishing a hydraulic plant on gold bearing bars at the mouth of Ruby Creek, where the Ruby Hydraulic Mining Co. is operating. The company intends to erect a saw mill and electric plant.

Salt Lake, Utah.—The Overland Gold Mining Co., near Rockdale P. O., Carbon Co., Chas. S. Crysler, manager, will install an electric plant shortly.

Jackson, Cal.—John Strohm intends to erect an ice plant to be run by electric power.

The contract for the electrical equipment of the San Gabriel Power Co. in Los Angeles will be let this week. 1000 horse power is to be transmitted to the city of Los Angeles.

Tuolumne County.—The contract for the electrical equipment for the big 6000 horse power transmission plant will be let in a few days.

Sacramento, Cal.—A long report in relation to the pumping plant at the water works was made by Cobb & Hesselmeyer to the effect that to make it efficient would cost $2,000 and to fit up for an electric motor would cost $6,000. Devine opposed the repairing of the Holly pump and the report was referred to the Water Committee. Cost $6,000

Butte, Montana.—A. C. Jewett has arrived from San Francisco to put in place the electric machinery for the Diamond Hill at Hassel. The generating plant will consist of 3-phase 500 k. w., about 600 h. p., 280-volt generator, coupled direct to Pelton water wheel.

Redlands, Cal.—The Southern California Power Co. has awarded bid for construction work in the Santa Ana canyon to Buckman Contracting Co., of San Francisco, whose agents are J. S. Antonelle & Co., of Los Angeles. Their bid for tunnel work is $6 per foot, of which there will be 10,000 feet. Price on flume work is said to be $31 per 1000 feet of lumber, which will amount to about $90,000. About $10,000 worth of pipe will be required.

Sacramento, Cal.—San Gabriel Electric Co, formed to acquire and sell power for application to mechanical and other devices, etc. Principal place of business, Los Angeles, Cal. Directors, R. M. Weed, Carroll Allen, J. A. Elliott, S. J. Chase, J. D. Wiiey, of Los Angeles. Capital, $500,000.

Two-Phase Work.—The Commercial Light & Power Company, San Francisco, has closed a contract with the Stanley Electric Manufacturing Company, through John Martin, Pacific Coast agent, for a 200 k. w. two-phase generator, which will be driven by a McIntosh & Seymour vertical engine.

Los Angeles, Cal.—The Chainman mine at Ely exepect to erect an electric light and power plant in connection with the mine and mill.

Seattle, Wash.—John A. Stewart, manager of the Red Shirt mine, on the Methow, contemplates the adoption of the electric reduction process at his mine. He has arranged for the erection of an electric reduction plant in connection with the 20-stamp mill at his mine. Preparations are being made for the establishment of a hydraulic plant on gold bearing gravel bars at the mouth of Ruby creek, on which property the Ruby Hydraulic Mining Co., is operating. The company intends to make three miles of ditch and flume, lay 1,000 feet of 24 inch pipe and install hydraulic giants, saw mill and electric plant.

San Jose, Cal.—C. W. Quilty, President of the Light and Power Co. has secured extensive water rights in Rio Honda, between this city and Mount Hamilton, as well as northward from the latter point, and it is claimed he has enough water to operate a power plant which will generate enough electricity to provide power for the lighting companies, street car lines and all manufacturing establishments.

San Bernadino, Cal.—H. H. Sinclair is President and J. H. Fisher Secretary of the Lytle Creek branch of the great electric syndicate. Surveys are complete for the building of the canal and the work will be pushed.

One of the most stupendous electrical engineering schemes on record, by which power is to be conducted from Santa Ana to Los Angeles, a distance of eighty-one miles, under a pressure of 33,000 volts, is now under way. H. H. Sinclair and O. H. Ensign, vice-president and electrical and mechanical engineer, respectively, of the Southern California Power Company have been in the city the past week placing contracts for the work.

Henry Fisher of Pittsburg, Pa., is the president of the company.

The power station is to be in Santa Ana Canyon, twelve miles from Redlands and eighty-one miles from the point of development.

The current will be generated at 1000 volts and transformed into 33,000.

This wil be the longest distance that power has ever been transmitted commercially. The highest voltage that has ever been in use before this is 15,000. This pressure of 15,000 volts is now used by the Central California Electric Company in transmitting power from Newcastle to Sacramento, a distance of thirty-five miles.

The power is derived from the waters of the Santa Ana River, which is to be directed from the stream by a canal, flume and tunnel work along the side of the canyon to a point where it suddenly drops through 2,200 feet of pipe a distance of 750 feet to the water-wheels.

The power generated will be sold to existing companies in Los Angeles and Pasadena, and will be used both for street railway and for lighting purposes. So far contracts have been signed with the Los Angeles and Pasadena Railway Company, the Los Angeles and Santa Monica Railway Company, the Pasadena Electric Light and Power Company, and the West Side Lighting Company of Los Angeles.

The contract for the generators, three 750 k. w., has been let to the General Electric Co., and the balance of the equipment, consisting of several thousand h. p. in motors, station equipments, transformers, etc., has gone to the Westinghouse Company. This is the most important contract let in California.

THE BAKERSFIELD POWER PLANT.

Electric power from the Kern river, the third largest stream in California, is now being transmitted to Bakersfield.

The power house is located at the mouth of the canyon on the north side of the Kern river, almost sixteen miles northeast of Bakersfield by wagon road. Here the stream, after a boisterous course of 100 miles from the slopes of Mount Whitney, through a series of rugged, precipitous canyons, forms a number of cataracts and rapids previous to taking a placid course through the cultivated valley lands. The point of diversion of the necessary flow for the power is some 9,000 feet up the canyon. Some ideas of the difficulties overcome in this work may be gained from the facts that to secure a bed for the flume a roadway was cut from the solid rock along the sides of the canyon. All the timber was hauled by a team a distance of sixteen miles to the south side of the river. A bridge was thrown across and a tramway 325 feet long with a grade of 30 per cent. laid up the steep hill to the point where the flume was to end. A steam sawmill was then set up at the foot of this tramway, the timber cut to proper dimensions, loaded on the cars and hauled up the grade.

The flume was begun at the power house end. This flume is 8 feet wide and 6 feet deep, and is covered. A railroad track is laid upon the cover for the full length of the flume, 8,000 feet. There are no sharp angles, the changes in the course being made by curves and tangents. The grade is 5.8 to the mile, and 475,000 feet of redwood is used in the construction of the flume, which at one point is carried on an arch with 60-foot span over a bad place on the cliff. The flow is calculated at 280 cubic feet per second. At its terminus at the mouth of the canyon, 8574.9 feet from the point where it leaves the river, it is 202 feet above the power house. Here the water enters a steel pipe 540 feet long and 5 feet 6 inches in diameter. The fall from the end of the flume to the power house is 201.9 feet, and the capacity of the water is estimated at 7,500 horse power.

Two 700 horse power Girard water-wheels furnish the power.

The electrical equipment consists of two 450 Kilowatt General Electric three-phase generators, running at 257 revolutions per minute. The voltage of the dynamo terminals is 550 volts. This is raised in step-up transformers to 11,000 volts, and carried on six No. 4 bare copper wires to the sub-station at Bakersfield, where it is transformed down to 2,000 volts for distribution.

The current will be utilized shortly to operate an extensive system of electric railroads, connecting Bakersfield with Kern and other districts. It will also be applied to street and house lighting, as well as to the operation of pumps for irrigation purposes. The mines in the mountains to the east will also probably take current for their mills, hoists, pumps, etc.

The president of the company is Chas. Webb Howard, W. F. Goad is vice president, and C. N. Beal secretary and treasurer.

RAILROADS.

East Oakland, Cal.—J. C. Johnson, receiver of the East Oakland Electric Street Railway Company, has applied for permission to borrow $12,000 to pay outstanding bills against the road.

Riverside, Cal.—A resolution was adopted by the Trustees granting the Riverside & Arlington Ry. Co. one year from June 3rd in which to electricize its lines.

Oakland, Cal.—J. S. Emery is authority for the statement that the San Pablo cable road will be converted into an electric line within a short time and extended to West Berkeley.

It is reported that Col. Geo. Stone and his friends are considering the proposition of building a new railroad from Nevada City to Marysville. It is said that a preliminary survey of the proposed route will cost about $2100, and that the Colonel intends having it made. If the plan then seems feasible, the Ayer Bros. will furnish half the money required to build the road.

Col. Geo. Stone is great at building railroads—on paper. He has Sonoma County fairly covered with electric roads built on that basis. If someone would give him money, no doubt the Colonel would build a road, but if the Ayer Bros. only put up half how can anything be done?

San Rafael, Cal.—An application was filed with the Board of City Trustees, asking for a franchise to operate an electric street railroad over the principal streets of San Rafael. At the next meeting of the County Supervisors application will be made for a franchise to extend the road to Ross Valley. J. W. Hartzell, who built the San Mateo electric road, is at the head of the enterprise.

It is the intention of Mr. Hartzell and his associates to secure a franchise that will eventually cover all the points of interest in and about San Rafael. Fourth street, the main thoroughfare of San Rafael, is to be traversed from the San Francisco and North Pacific depot to the corporate limits of the city and then the tracks of the proposed line will be extended along the county road through San Anselmo to Ross Valley. A branch will be extended to the Mount Tamalpais Cemetary.

The estimated cost of the road, including power plant and rolling stock, is $13,000 a mile. Ninety thousand dollars will be required to build the seven miles of road within the city limits of San Rafael and the line to Ross Valley.

LIGHTING

Guaymas, Mex.—The General Electric Co. has sold a 17½ k. w. 125 volt lighting plant to G. E. Wollerth.

Northwest Co., of New Mexico, by Thos. L. Harris, J. W. Lovell, et al. Objects, mining, construction of railroads, electric plants and water systems. Capital, $20,000. Principal place of business, Santa Fe, N. M.

Anaheim, Cal.—The California Electrical Works have sold a 60 k. w. Warren alternator to the city.

Ventura, Cal.—The California Electrical Works have sold a 10 k. w. D. C. plant.

Guerneville, Cal.—The Sonoma Lumber Company has purchased two 15 k. w. generators from the Westinghouse Company.

Sacramento, Cal.—The Central California Electrical Co. has purchased one 150 and one 75 k. w. converters.

The Mutual Electric Light Co. is doubling the size of its plant on Howard street, owing to the great increase in its business. The new machinery will be furnished by the Fort Wayne Electric Corporation.

San Leandro, Cal.—Trustee Eber was directed to advertise for bids for the purchase of the electric light bonds, bids to be handed in before June 21st.

Tucson, Ariz.—The Ideal Electric and Manufacturing Co. by E. T. Cowley, F. E. Wolf, and F. W. Steinecker, to manufacture electric and other appliances, with a capital of $150,000. Principal place of business, Tucson, Ariz.

San Bernardino, Cal.—When C. R. Lloyd tried to secure the street electric lighting, he formed a company and purchased the Peter Kehl mill and water power, paying part, and then suing for damages to offset the balance. The sale was made in 1892, and the suit has been decided in favor of the defendant, by which $40,000 damages are knocked out and the claim of $16,000 to Kehl is confirmed.

Springville, Utah.—At a mass meeting held last evening the citizens passed a resolution, to the effect that the city should build and equip an electric lighting plant as soon as possible. A committee of five was appointed to act with the Council Chamber on Public Improvements, in making further investigations and report in two weeks. The following are the committee: S. M. Davis, F. M. Snell, John S. Boyer, James Caffrey, H. M. Dougall.

Santa Barbara, Cal., Independent, May 26th.—Matidija is to be lighted with electricity.

Lompoc, Cal.—The Council body has under consideration the putting in of an electric light plant for lighting purposes.

Pasadena, Cal.—W. S. Abbott & Co., of Los Angeles, have made a proposition to the City Council to furnish electric power.

Ventura, Cal.—J. A. Day proposes installing an incandescent lighting plant at Wheelers Hot Springs.

Sausalito, Cal.—The Electric Light Co. will soon make an important addition to their plant.

Wenatchee, Wash.—Wenatchee Water Power Co. expects to furnish electric light for the town of Wenatchee and will possibly put in a system of water works.

Slocan, B. C.—Messrs. Thos. Mulvey and W. R. Clement have formed a copartnership with Percy Dickenson and John Thomas of Tacoma for supplying city with electric lights in addition to a water supply from Goat Creek.

Myrtle Point, Ore.—A. Nelson, proprietor of Cottage Grove electric light station, has been in correspondence with the City Council relative to installing an electric light and water plant at this place. He favors the plan of erecting a reservoir near by and constructing a small steam pumping station to supply the reservoir with water.

Sacramento, Cal.—Trustees.—Experts Ridley and Halliday, who were employed by the trustees to make an estimate for an electric plant that could be erected by the city, have made their report to the city. In their judgment the cost of installing a plant fulfilling certain conditions, generators, arc lamps, etc., would be approximately, $63,658.14.

Independence, Ore.—An offer of $24,000 has been made by City ouncil for purchase of water works and electric light plant here, but it lacks about $6,000 of meeting asking price of present owners.

Fortuna, Cal.—Swortzel & Williams, owners of the Humboldt Milling Co., which was recently burned out, are going to rebuild. The electric light plant was also destroyed at that time, but a new dynamo for the plant is expected in a short time. The first floor of the new mill is up, and the whole structure will be completed in three or four weeks.

Aberdeen, Wash.—Bob Lowry has leased the plant of the Electric Light Co. and will hereafter conduct the same. It is his intention to extend the line and otherwise add to the efficiency of the system.

Santa Cruz, Cal.—H. F. Anderson of Ben Lomond has contracted with the Big Creek Power Co. to put in a 60-light dynamo, to be operated by water power from the San Lorenzo River.

Phoenix, Ariz.—Petition of the Phoenix Light and Fuel Co., requesting permission to erect and maintain electric light line, was granted.

Chas. C. Moore & Co. have sold to the Alcatraz Co. for their refineries two Babcock & Wilcox motors, aggregating 350 horse power. Also four boiler plants with Green's economizers to the Hawaiian Islands. Aggregate, 900 horse power. Also 700 horse power boilers for the sugar refinery at Watsonville.

Mr. Chas. C. Moore has gone East on a short business trip.

Stanford University.—E. E. Farmer, an assistant instructor in the electrical engineering department of the University, has constructed a machine to be used by the Alaska Seal Commission in branding female seals in the north this summer. A dynamo turned by four or five men is used to heat a platinum wire to a white heat. This is used instead of the red-hot iron. The wire has been applied to cats and used on several other kinds of fur. It leaves a more distinct and seemingly more permanent mark than the hot iron.

Dr. Jordan thinks the new method of branding is a good one and says that it will be given a trial this summer.

Habirshaw Wires on the Coast.—The agency for the Habirshaw Wires has been taken by Chas. R. Lloyd, No. 18 Second Street, San Francisco.

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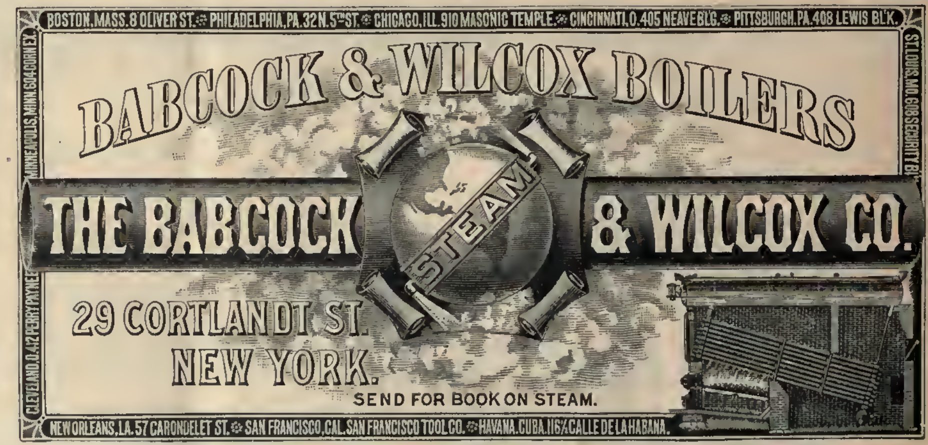

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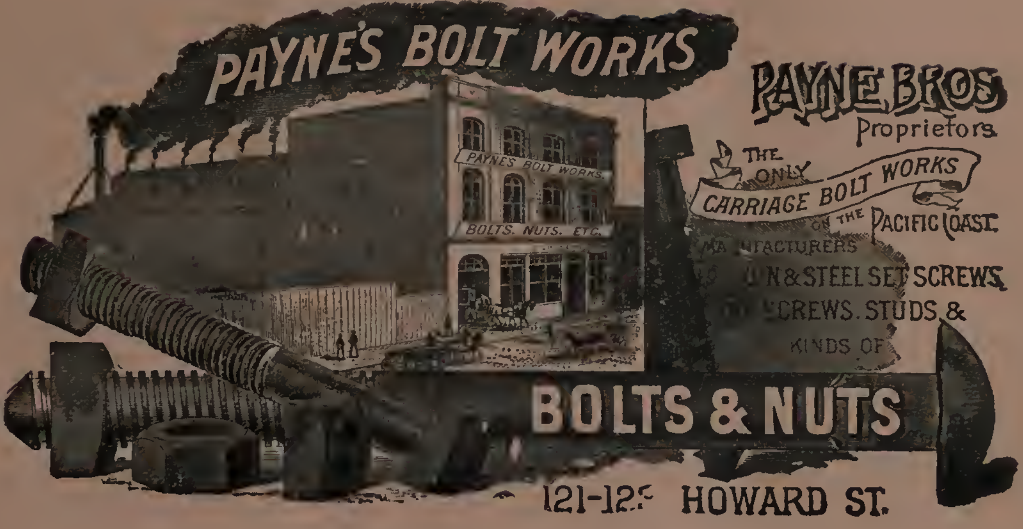

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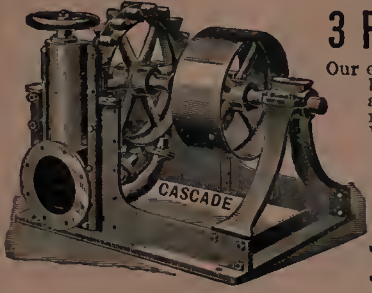

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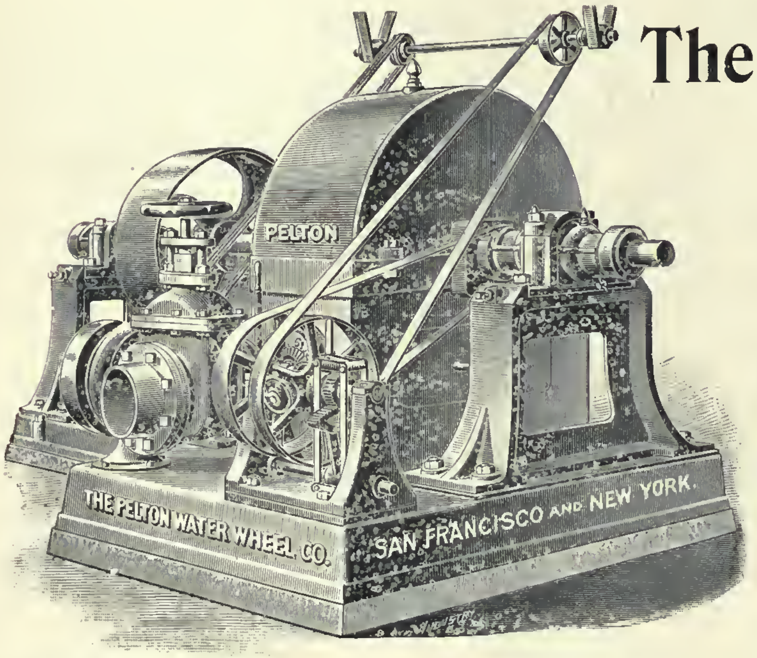
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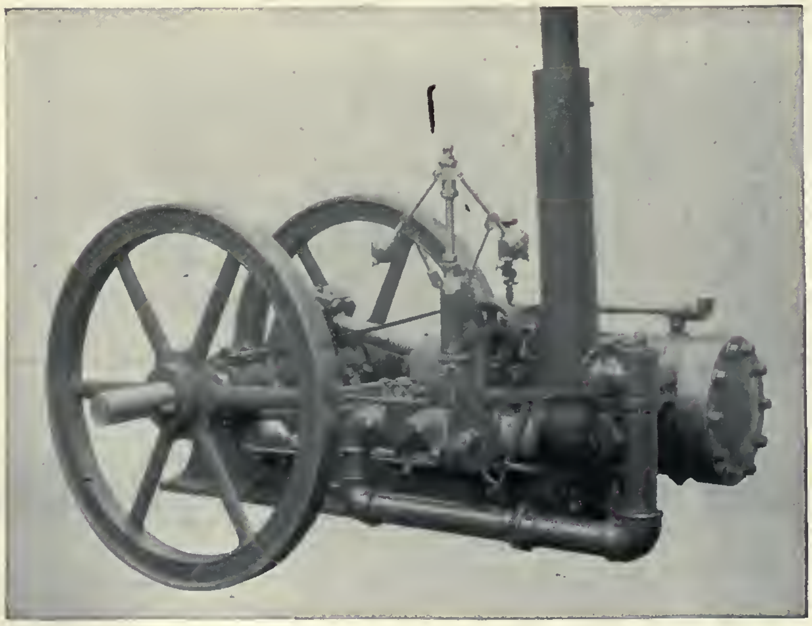

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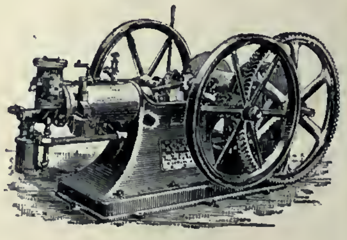

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VOL. XVIII. JULY, 1897 No. 7

ELECTRIC MOTORS IN RAILROAD SHOPS.

The use of electric motors in railroad shops is extending as the advantages which electric drive presents over steam or compressed air drive for the heavy machinery to be found in such shops are being brought home to those who have them in charge. Instances are multiplying throughout the country of the installation of electricity in lieu of steam or compressed air. Without assuming that electricity is the panacea for all the troubles connected with the drive of railroad shops, there can be no doubt that the advantages which its use presents are such as to compel attention. The motor may be placed in the most convenient position, whether on the floor, on a shelf or suspended from the ceiling; it does away with the steam pipes and the troublesome exhaust and with the compressed air pipes and the equally troublesome heating apparatus; it abolishes the big main belt and relegates the prime motor to a position far removed from the shops themselves, where the danger of fire is lessened and consequently the insurance rate reduced; the attention demanded by the electric motor is so slight as to be almost negligible, and last and perhaps the most important, the power consumed is directly proportional to the work done.

Electricity is used to drive all the machinery in the shops of the Northern Pacific Railroad at Edison in the far West. Recently the completion of the long distance transmission line between Folsom and Sacramento, Cal., has placed it within the power of the Southern Pacific railroad to use motors in their shops at Sacramento with most satisfactory results. In their operation the motors have already shown considerable economy over that by the original steam plant which they superseded. The motors are placed in the shops where steam engines had previously been used and the difference between the results obtained apart from the mere question of economy is marked.

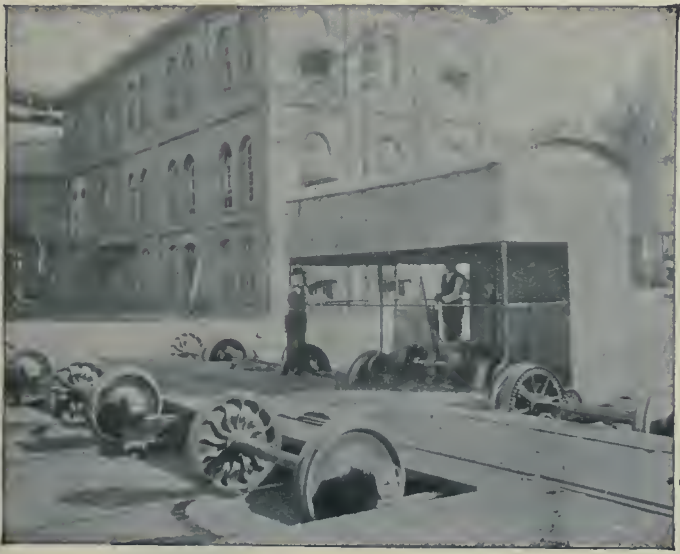


FIG. 1.—TRANSFER TABLE IN SACRAMENTO SHOPS, SOUTHERN PACIFIC RAILWAY.

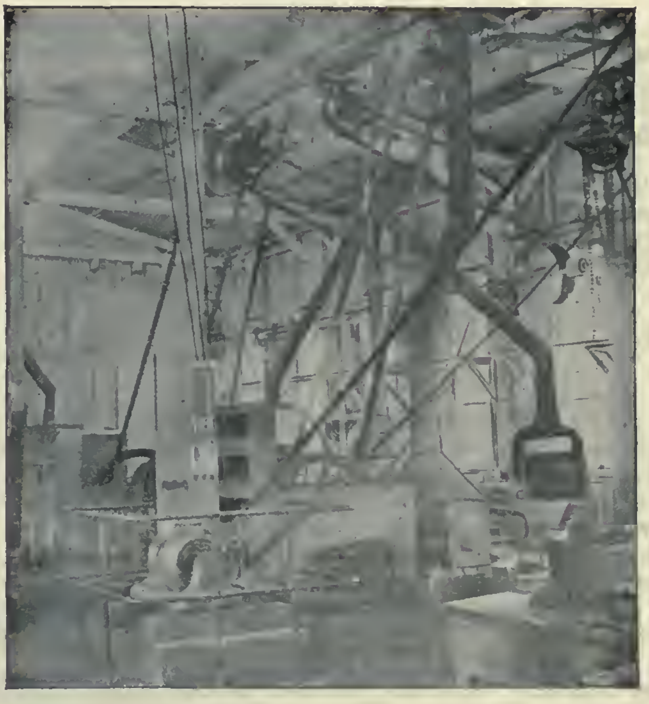


FIG. 2.—INTERIOR OF SPRING SHOP SACRAMENTO SHOPS, SOUTHERN PACIFIC RAILWAY.

Three motors are used; the first is a direct current motor placed upon a transfer table used for shifting the locomotives. This motor is a G. E. 800 similar in every respect to those used on the ordinary trolley car and is driven by 500 volt railway current from the station. It is so geared that it operates not only the table, but also drives a drum carrying a wire cable used to haul the locomotives upon the table. This it does with perfect ease hauling all sizes of locomotives. Instead of taking the current from the overhead wire by means of a trolley, the conductors are laid in an underground conduit and the contact is made by means of a plow running in this conduit. Some fears were at first expressed as to the result in rainy weather, but although considerable rain has fallen since the installation of this motor no difficulty has been experienced. The transfer table and motor are above in Fig. 1.

The motor used to operate the machinery in the boiler shop, as well as the tender shop, is a 50 horse-power motor driven by 440 volt current from the step down transformers. The machinery in these shops is peculiar in that each machine is provided with a heavy fly wheel for carrying it over the sudden shocks which occur in punching and shearing and similar work. For three or four minutes the motor has an excessive amount of work thrown upon it in starting the machine from idleness and until the maximum speed is acquired. The load then drops to 30 horse-power.

Such sudden drops as this are calculated to demoralize motors of ordinary construction; with the induction motor the drop in the load is hardly noticed.

Fig. 2 shows the interior of the spring shop, driven by a 10 horse-power motor; this motor also has to cope with sudden heavy loads. In this shop all the springs,, spiral, elliptical and leaf, used in the construction of locomotives, etc., are made and the most difficult piece of work done is the making of the spiral springs, some of which come to the machine as a bar of red hot iron 1¼ inch in diameter. This placed in the machine is instantly wrapped around a mandril and it is such work as this that throws for a few seconds an enormous load on the motor. Although it has been in use for some time it shows no sign of strain.

The two motors last named are of the General Electric Company's three phase induction type, without commutator, collecting rings or brushes. They are driven by 440 volt three phase alternating current from the transformers which step down the 11,000 volt current transmitted 24 miles from the generating station at Folsom. This installation is only one of many made since the completion of the transmission from Folsom to Sacramento, which latter city is rapidly becoming dependent on electricity as its exclusive motor power.

LATEST TYPE JEFFREY ELECTRIC CHAIN COAL-MINING MACHINE.

Operators and mine managers using coal-mining machinery will be interested to know that The Jeffrey Manufacturing Company, Columbus, Ohio, have recently placed on the market an improved Electric Coal-Cutting Machine; an illustration of which is herewith presented.

The machine as shown, is constructed on lines similar to the ones previously built by this Company, and is the outcome of experience gained during twenty years of actual operation. It contains the necessary qualifications to make it superior to all others that have preceded it.

This company being the pioneers in the manufacturing of coal-mining machinery, have had the advantage of a great many years' experience in the construction of such machines. With this experience and a well equipped factory, they have been able to keep abreast of the times, and to maintain their position as leaders.

The most marked improvement in the machine is found in the motor. This is known as the "MM 17 A" motor, and is of the multipolar ironclad armature type. It is built to perform the most severe duties to which a coal-cutting machine is subjected and is calculated to operate with mimimum repairs, together with high efficiency. The frame is of cast steel, the magnetic circuit being of ample capacity to allow of no undue heating.

JEFFREY ELECTRIC CHAIN COAL MINING MACHINE.

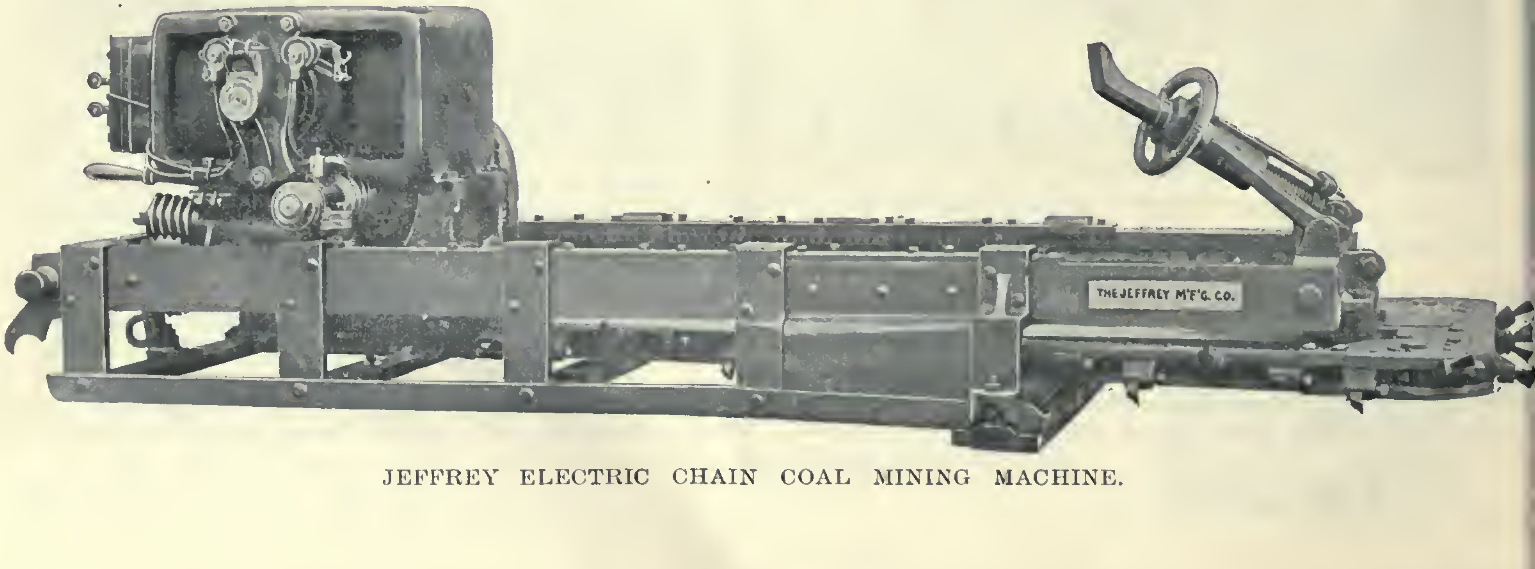
The armature is of the ironclad type, that is the wires are imbedded in the core of the armature, the outside of the armature having the appearance of a solid band, this gives protection against injury, while moving from place to place or from any unusual rough treatment it may receive; it is calculated to run continuously. The armature shaft has large and ample bearings and the longest runs have failed to develop over-heating.

The field coils are of ample capacity to carry their proportion of the current at the rated capacity without undue heating, and develop an extremely low temperature after a continuous run of several hours on full load.

There is absolutely no sparking at the commutator, and the rise of temperature at this point is exceedingly small. The commutator is made of the best quality hard drawn copper and is of ample capacity.

All pinions, worms and worm wheels are keyed on to their respective shafts. In the early machines these were forged on to the shaft and then cut, this was done in order to secure minimum space. The trouble arising from this source and the great expense attached to replacing them (it being necessary to replace shaft and gears, when gear became disfigured) was so great that it was finally considered to be impractical and the change was made to separate shafts and separate pinions. The shafts are forged steel. The pinions are keyed to the shaft. By doing this the safety was increased and expense in repairs decreased. The construction has been carried out for several years and has thoroughly demonstrated its value. All the bearings are of bronze, no babbitt being used in any case.

The chain carrying the cutters is made of cast steel solid links coupled together with drop forged straps; these strap links having lugs at each end which provide bearings for the cutter links, the straps being held together by means of a rolled steel rivet, which receives no strain whatever. By this construction the chain is easily taken apart and can be replaced in minimum time. The bits used are straight with a slight hook at the cutting end and are so



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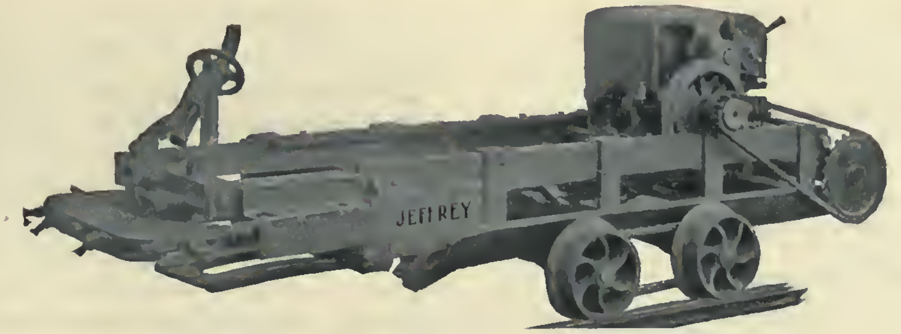

JEFFREY ELECTRIC CHAIN COAL MINING MACHINE.

shaped that they can be resharpened a number of times, allowing about seventy-five per cent of the steel in each bit to be used.

Another marked change is in the cutter head; this has been widened to cut six inches more than the former machine, making the total width of the cut forty-four inches, with a kerf of four inches. The cutter head is bolted together and can be easily and readily taken apart. At each corner of the cutter head is an idler on which the cutting chain runs.

To provide for an ample supply of oil to the bearings of the idlers a double bearing is used, allowing space for packing, which holds the oil, thus providing a constant lubrication at this point. This is of very great importance, as there is much strain at these points, which are most apt to be neglected by the machine operator.

These machines are built to under cut five feet, six feet and seven feet, the width of each cut being forty-four inches, with a kerf of about four inches.

All machinery built by this Company is made to templates and in case of accident by fall of roof or other unusual circumstances, any parts can be replaced without delay.

Considering the machine as a whole and in detail, it is an excellent piece of machinery and one that will stand the inspection of the most critical mechanic.

The self-propelling truck, which is also illustrated, with machine (both on and off) is a valuable addition to the machine where heavy grades are to be encountered and where pitching veins occur. With this truck it is possible to convert the machine into a locomotive and cause it to propel itself from point to point. By means of a reversing switch on the motor it is possible to run it in either direction. It will be observed that the motion is imparted to the truck wheels by means of a chain and sprocket. This method of propulsion is being used in mines pitching from 12 to 15 degrees. The truck itself is entirely of iron and is strongly and compactly built.

Since this machine has been in operation, records of three hundred lineal feet face, five feet and six feet deep, have been made in ten hours. The reduction in cost of repairs and the increased efficiency recommend it to the use of operators in need of such machinery.

The Jeffrey Manufacturing Company has always had the reputation of producing nothing but high grade work and in considering the bringing out of the machine (here described and illustrated) the question arose as to the wisdom of placing on the market a machine of cheaper construction, but realizing that by reducing the standard of construction and workmanship the life and efficiency of the machine would be decreased, they wisely made the decision not to lower the standard of excellence of their construction.

PACIFIC COAST ELECTRIC TRANSMISSION ASSOCIATION.

A meeting was held last month in San Francisco by representatives of the various electric power transmission companies and the Pacific Coast Electric Transmission Association was organized for purposes of mutual protection and the collection and dissemination of knowledge relative to electric power transmission.

The companies represented at the meeting were the Blue Lakes Water Company of San Francisco, the Big Creek Power Company of Santa Cruz, the Southern California Power Company of Redlands, the Central California Electric Company and the Sacramento Electric, Gas and Railway Company of Sacramento, the San Joaquin Electric Company of Fresno, the Power Development Company of Bakersfield, the Portland General Electric Company of Portland, Or., the Nevada County Electric Power Company of Nevada City and the San Gabriel Electric Company of Los Angeles.

The officers elected were as follows: President, C. P. Gilbert, manager of the Sacramento Electric, Gas and Railway Company; Vice-President H. H. Sinclair, manager of the Southern California Power Company; Secretary and Treasurer, Robert McF. Doble, Secretary of the Blue Lakes Water Company; Executive Committee, W. Frank Pierce, President of the Blue Lakes Water Company, and J. J. Seymour, President of the San Joaquin Electric Company.

The annual meetings of the association will be held in San Francisco, while other meetings will be held at intervals at the various power stations throughout the Coast, when papers will be prepared and read on topics of interest.

At the first meeting there was an informal discussion in regard to insulators. The same subject will be taken up and discussed formally at the next meeting, which is to be held at Santa Cruz about the middle of August, when papers will be read by Mr. Seymour and Dr. Van Norden.

The association will not accept as members any dealers in electrical or other supplies, or the representative of any manufacturer.

"The Induction Coil in Practical Work." By Lewis Wright, New York and London. The Macmillan Co., 1897. Cloth 12mo. Illus. 172 pp. Price $1.25.

This is a simple and admirable book of the new class called into being by the development of Rontgen ray work. The opening part is devoted to an exposition of principles and practice in connection with induction coils. The next part deals with experiments in vacua; there is a good chapter on spectrum work; and then comes an excellent section in regard to the Rontgen ray and various types of vacuum tubes designed specially for that line of investigation. Why such a serious and well intentioned volume should issue without an index is more than we can venture to explain.

THE PACIFIC ELECTRICIAN.

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ELECTRIC WIRES TO GO UNDERGROUND.

Some time since the Board of Supervisors requested each of the companies owning telegraph, telephone or electric wires strung on poles to furnish a list of the lines in use and make suggestions that would aid the Board in preparing a plan for an underground conduit system in the business portion of the city.

The Southern Pacific Company has in accordance with this request suggested that Howard street be made the southerly boundary of the proposed conduit system, and Eleventh street the westerly line to Market street. This line could be continued along Van Ness avenue to California. The northerly boundary would be more or less irregular in order to avoid the residence portion along the hill on Californa street, and then could run along Dupont street direct to the bay.

This would take in the business portion of the city and the district could be extended later as necessity arose. We trust the present Board of Supervisors will push the matter through without any undue delay.

The wave motor at Redondo beach is said to mote successfully, but we notice that the wharf from which it has been operating is found to be too near the shore, and a force of men are now engaged in extending the wharf 200 feet farther out into the ocean. There seems to be always something more needed to make these wave motors completely successful.

Recently a pair of eagles lit on the pole line of the San Joaquin Electric Co. and made a short circuit, according to the local papers. The eagles were electrocuted.

J. R. Cole has taken the agency of the Cutter Electric Mfg. Co. for the I. T. E. circuit breakers and the C. S. flush switches.

What has become of Dr. Rottanzi's scheme for a lighting plant for the New City Hall?

THE X-RAYS AND MICROBES.

There has been considerable wild talk and conjecture as to the supposed value of the X-rays in destroying bacterial life, and there have been several instances of persons being severely burned as the result of attempts to carry out this idea. Recently some experiments were made in Scotland by Dr. Blackie, President of the Edinburgh Royal Medical Society, that go to show that the microbe thrives, rather than pines when subjected to the powers of the X-ray.

A number of guinea pigs were inoculated, and part of them subjected to eight hours' exposure to strong X-rays.

All the pigs died, but those that had not been exposed to the X-rays lived considerably longer than the rest. Dr. Blackie also subjected certain microbe cultivations to eight hours under the X-ray, and afterwards inoculated a number of pigs with the toxin. The pigs died.

Tesla recently stated in an article in the Electrical Review that he considered that his experiments during a period of months with the X-rays had benefited his health, but he ascribed it to the ozone that was generated during his experiments. His trouble was evidently not due to microbes.

It would appear as though the people of Southern California had gone wild over the subject of long distance electric power transmission. Although the Southern California Power Company will be able to furnish all the electric power needed in Los Angeles for several years to come, work appears to be going on on the Kern river 100-mile transmission, while the local papers are full of additional water powers that have been taken up in all directions. A glance at our news columns shows to what an extent this movement is going on, and it is evident that someone is in for a disappointment.

Mr. Ryder, the inventor of the combined gas-engine dynamo, storage battery, electric motor street car is still living on hopes, although his motor has as yet failed to revolutionize either the street railroad business or his financial prospects.

We would call his attention to a certain Mr. Patton of Chicago, who has for a number of years been experimenting on exactly the same lines, and who, although he has spent over $100,000, is as yet unable to make his queer combination work successfully.

That American machinery was chosen for the electrical equipment of the Central London Railway Company merely emphasizes the fact that we are away ahead of the rest of the world in the use of electricity for street railway work.

The Siemens-Halske Company and the Pennsylvania Iron Works have been consolidated and have made one of the strongest concerns in the country. The combined capital is $3,250,000.

The Electric Light Co. has succeeded in securing the shutting down of the plant at the Safe Deposit Building on California and Montgomery streets. It made an offer to furnish light for the building and power for the electric elevators at a monthly rate equal to the monthly coal bill for operating the plant. The lighting is not as good as it was before the change, as the starting and stopping of the elevators affects the candle power.

Superintendent W. R. Hewitt of the city fire alarm and police telegraph service has asked the Supervisors for $118,000 for the coming year to be used in operating and extending the system.

The regular running expenses are about $25,000 per year. This is one of the best managed departments in the city government, and Mr. Hewitt should be given the money he needs to keep it up.

An interesting accident occurred last week at the power house of the Tacoma electric railway system. The governor of the engine became disabled and the 1000 h. p. engine ran away. The engineers were unable to shut off the steam and the speed of the engine became so great that the fly wheel, 35 feet in diameter, weighing forty tons, flew to pieces, wrecking the power house.

All Carson is said to be excited over the discovery of a new kind of gas generated by the Hon. Evan Williams. It is estimated that he can furnish gas for a 16-candle power light to run thirty-six hours at the cost of a glass of beer. The light is not deadly and is soft without a shadow. Next!

Mr. Cartwright is again back at his old place as electrical engineer for the Fort Wayne Electric Corporation.

Mr. Lloyd has a new assistant, a Mr. Pardee, who has come from the Fort Wayne shops to learn the ways of the Coast.

Mr. Ed. Roe is no longer superintendent of the electric lighting department of the Gas and Electric Lighting Company. Mr. Poole, who has been with the company for a number of years, is now superintendent.

Mr. Martin, the Pacific Coast agent for the Stanley Company, moved last month to 300 California street, the building formerly occupied by the Grangers' Bank. It is one of the best locations in the city.

Mr. F. V. S. Lee, a graduate of the Electrical Engineering Department of Stanford, '97, has accepted a position as engineer with Mr. Martin, Pacific Coast agent of the Stanley Company.

The California Wire Works and Mr. A. S. Hallidie have moved offices to 330 Market Street, corner of Battery

STATIC SPARKS.

The Electrical Engineer states that Mr. T. T. Williams, business manager of the San Francisco Chronicle, speaks very highly of the Bullock electric motor. Has Mr. Williams been promoted?

Mr. Elder of the Westinghouse Company is in the East on business. His absence at the same time that the Christian Endeavorers came to town is merely a coincidence—he will return, however, after they have departed.

The daily papers report an electric woman in Oakland who belongs to the Salvation Army. She can light the gas with her finger or shock an ordinary man by merely looking at him.

It seems as though she might be utilized in some manner. They might put brushes on her and run an X-ray outfit or use her to run a fan motor.

The Examiner prints an article said to have been written and copyrighted by Thomas A. Edison, which is practically a republication of a lot of bosh that appeared a year or two ago. Among other absurd statements is one in regard to so-called aerial torpedoes. Edison states that he believes that they can be constructed for $1500 each, capable of carrying 500 pounds of dynamite. A flock of them are to be let loose to drop dynamite in various directions. The great inventor states that the explosion of 500 pounds of dynamite would destroy a war vessel at a distance of two miles, which is all folly. Again he talks of electric cables concealed around a city so that an enemy could not find them, which would deal death and destruction on all sides.

Edison might well be in better business than working up such fakes on the public as this.

We have received a communication from a belated Silverite who seems not altogether joyous over certain comments that we made last September on the subject of free silver and business prosperity. He swears a little to relieve his feelings—at least we suppose he tries to swear when he writes "dam", although if he wants to be a real bad man on paper he should learn how to spell and also how to write his name.

He asks "how in Hell" we expect a business boom while "silver mines are dormant"? and then he lays down the following financial program: "More money—more happiness—more tin pails carried full by the laborer—less tramps—less business failures—less hunger—less want."

This sounds fairly well, although we do not like the expression, "less tramps"—it would have been better if he had written, "fewer tramps"; still that is a mere detail and does not invalidate his scheme for prosperity. We understand that President McKinley is hoping to appoint a commission to investigate these matters that appear to be wearing on our correspondent, and we would suggest that it might relieve his overcharged feelings if he drew up an outline of his scheme and sent it to the President—it would be advisable for him to learn to spell, of course, and in the meantime he had better go and tell his troubles to a policeman.

MACHINE TOOLS OPERATED BY COMPRESSED AIR.

By Edward A. Rix, M. Am. Soc. M. E. M. Am. Soc. C. E.

The builders of machine tools are now beginning to recognize the use of Compressed Air as an important adjunct to the operation of their machinery. About the first machine tool put upon the market was the Pneumatic Chipping and Riveting Tool which won such a pronounced success at the very outset, that at present four or five different companies are making these tools which consist simply of a small cylinder within which a piston hammer reciprocates many thousand times a minute, with an extremely short stroke, striking the head of a chipping, calking or riveting tool. The whole apparatus weighs, depending upon the size, from two to ten pounds and with it one man can easily do the labor of three, working in the ordinary manner. As an instance, the manufacturers of one of these tools claim that with the beading tool they can bead flues in a locomotive boiler at the rate of 1½ flues per minute and in calking boilers these tools will do the work of four men.

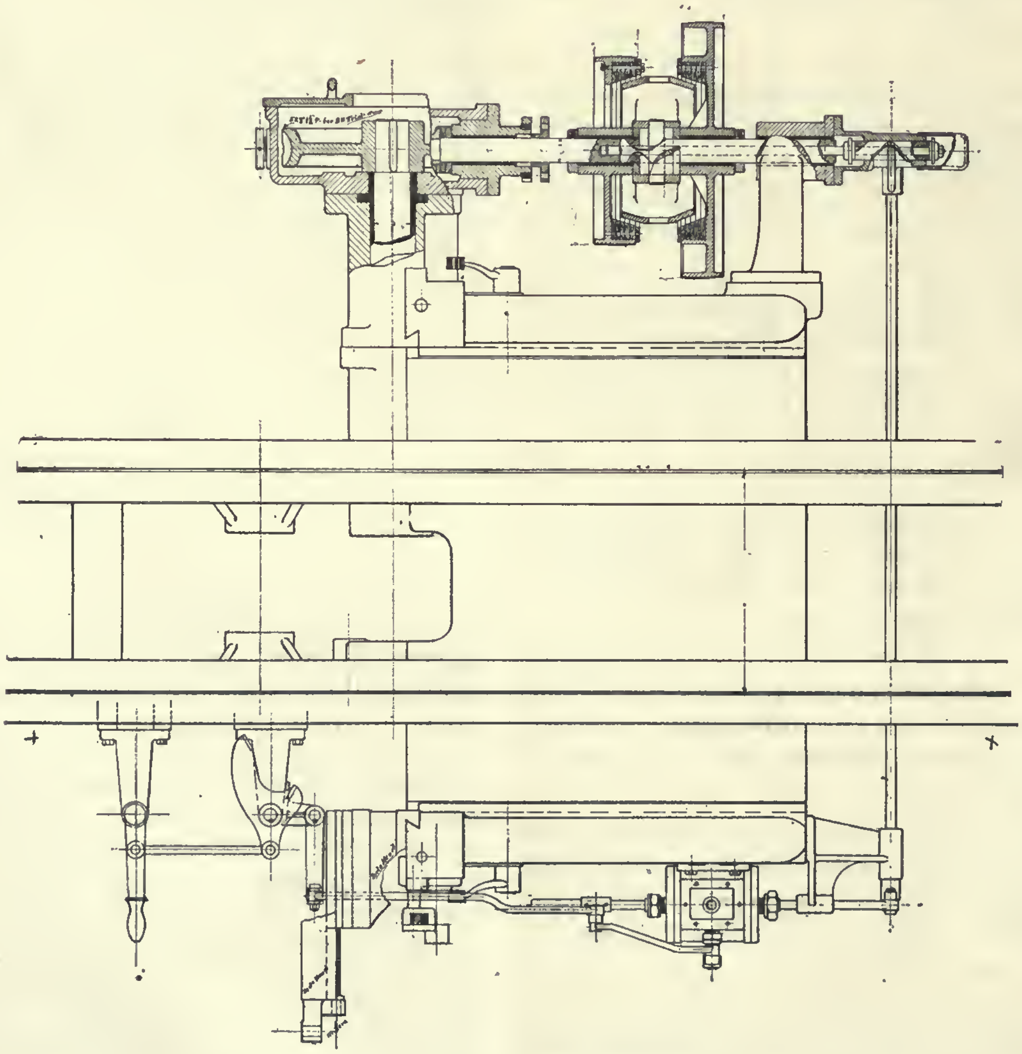
The next shop tool of any importance that was developed, was the Hackney Pneumatic Hammer, which is a hammer giving all the effect and efficiency of a steam hammer but run by compressed air, the peculiar part of the tool being that the cylinder is reciprocated by means of a crank and pulley direct from the line shaft giving by this reciprocation compressed air above or below the piston, causing the piston to reciprocate within the cylinder at any length of stroke and at any force of blow within the range of the hammer.

This was an exceedingly satisfactory tool, easy to operate and entirely self-contained, requiring merely a belt connection to the line shaft to put it in operation.

Following in the track of the Pneumatic Hammer has come the development of the Pneumatic Hand Drill, which consist of various forms of Rotary Motors driven by compressed air, geared to a drill, all enclosed in a case with two handles for holding the tool in position. Connected to a small hose this drill is entirely portable and will drill holes up to 1½ inches in diameter. There are two or three concerns manufacturing these tools and they are extremely useful about ship yards or in any construction whatever, especially in the drilling of I-Beams around buildings or in bridge work or for general machine shop practice where the drill known as the "Yankee" drill has heretofore been used.

The latest development in the use of compressed air for machine shop tools is recently announced by the Niles Tool Works, as follows:

"The conditions attending the movements of planers are such as to have made the arrangement of the feed of same very difficult and nothing had been found among all the



PLAN SHOWING PLANER WITH PNEUMATIC FEED.

many arrangements that had been and are now in use, that would accomplish this satisfactorily and without more or less annoyance from time to time, until Mr. Gordon, President of The Niles Tool Works Company conceived the application of compressed air to this purpose.

A wholly reliable and positive feed has long been desired and never fully attained. In Gordon's device, the feed is actuated by air, and is absolutely positive and reliable, and practically unlimited in range.

A quicker return than ordinarily obtained is desirable. By the operation of clutch-pulleys by air, any desired speed may be obtained, and the mechanism is exceedingly simple, with few parts and none subjected to excessive wear.

We illustrate herewith the above patented pneumatic feed and quick return. The air is taken from the compressed air supply such as is now in use for general machine shop purposes or from a small pump that may be attached to the machine in any convenient position and driven by a belt from the countershaft. It is carried from the pump or compressor through suitable pipe to the air cylinder that controls the feed and driving-clutch mechanism.

A specially constructed valve admits it to the cylinder. This valve is operated through simple connections, fully shown, by the shifter arm and reversing tappets on the planer table. When the table carries the tappet or dog against the reversing lever, instead of shifting the belts, as in the ordinary planer it moves the valve-lever controlling the air admission to the cylinder. This instantly throws the piston in the cylinder to the opposite end carrying the rack to which it is attached, forward or backward to operate the feed-rack. At the same moment the clutch operating the worm-shaft is thrown over and the direction of the table motion is reversed. This shifting arrangement is extremely simple and most efficient.

By examining the figures, 1 and 2, you will notice that the piston rod is carried through the cylinder toward the back of the planer and is connected to a lever. The opposite end of this lever is attached to a rod running across and under the bed to the worm-shaft. On the worm-shaft end of this rod is a segmentgear whose teeth work into a short rack. The rack is attached to a rod which moves the central member of the clutch from one pulley to the other and the pulleys are operated, one by straight and one by cross-belt. It will easily be seen how the reverse motion is obtained.

Figure No. 1 shows the clutch-pulleys, bearings, sleeves and casing in section, exposing the clutch shifter-rod in the interior of the worm-shaft and clearly shows the various features of those parts.

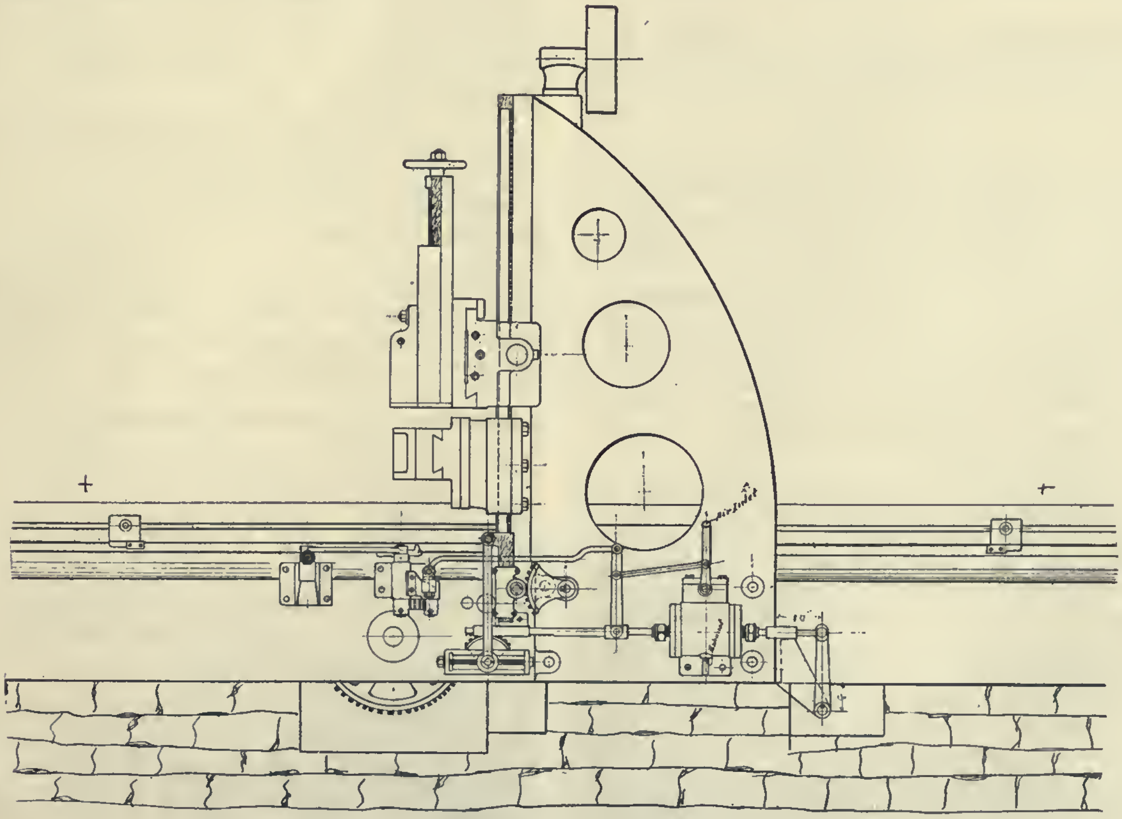
The belts run continuously in one direction, thus preventing the excessive wear due to shifting, to overcoming momentum of pulleys and other parts and to the rubbing of the edges of the belt in the shifter-eyes. The belts can be made as wide as the necessities of the case require, not being limited by any of the conditions always prevailing in other planers. The clutch, from its peculiar construction, holds most tenaciously under very slight pressure and is quite easily released.

There is absolutely no adjustment required in keeping the clutches in working order, as they will do their duty until the wood facing is entirely gone, and the replacing of this facing or lining will not cost nearly as much as the repairs to and replacing of belts. This is an ideal machine for variable speeds, as the pulleys controlling the cutting speed can easily be made, cones and belt shifted as on a lathe.

The pulleys operating the return stroke could also be made in this manner and the speed increased or decreased as the piece being planed was very heavy or very light.

We would sum up the peculiar merits, as follows:

1st. Instantaneous, positive and maximum feeds.



ELEVATOR, SHOWING PLANER WITH PNEUMATIC FEED.

2nd. Quick return, 6 or 8 to 1 with air cushion, positively preventing all shock.

3rd. Economy in operation and power required.

4th. No shifting belts, and,, hence, freedom of wear.

5th. Variable speeds without the use of special appliances.

6th. Simplicity in design, involving no complicated mechanism, nor necessitating other than the ordinary provision made for any other planer."

Belts for driving machine tools have long been recognized as a nuisance, and in modern shops they have gradually disappeared from overhead and have been driven upwards from underneath the floor.

Many manufacturers have introduced, with satisfactory results, individual electric motors for operating lathes, drill presses, etc., and some thought has been given and some experiments have been tried to put in small compressed air motors for the purpose. There is ample field and a good opportunity for some one to invent the proper kind of inexpensive and economical air motor to be used direct connected to machine shop tools,, and it would prove remunerative to anyone who would experiment to a successful end with this class of motor.

AMERICAN MACHINERY IN ENGLAND.

The most recent addition to the system of underground railways with which London is provided and the most important of all the present undertakings of a similar character in the world. The Central London Railway (underground) has an especial interest for Americans. This is due to the fact that the entire system of electrical equipment will be American. With the exception of the elevators the entire electrical contract has been assumed by the British Thomson Houston Co., Ltd. representing in Great Britain the General Electric Co., of Schenectady, while the elevator contract has been secured by Mr. Frank J. Srrague of New York. ......

The road laid in two deep subway tunnels, stretches from Liverpool street beneath the station of the Great Eastern Railway Co., near Broad street, the city terminus of the North London Railway and the Bishopgate Street Station of the Metropolitan Underground Railway, through the very centre of the great commercial district of the city and runs due west under Holborn, High Holborn, Oxford street and past Hyde Park as far as the Generating Station located at the terminus of Shepard's Bush. It follows the line of greatest traffic in London.

The construction of the road itself has been carried out by the Electric Traction Company which has also financed it. It is this Company that has made the contracts with the British Thomson Houston Company, and which will turn over the road fully equipped and in working order to the Central London Underground Railway Co., ready for operation.

In laying the road bed, the best modern steam railway practice has been followed. The steel rails weigh 100 lbs. to the yard and are laid upon heavy cross ties. The system of contact will be the third rail, with the contact rail placed between the service rails of the track and insulated. The conductors will be fed at intervals from a copper feeder cable. This feeding will be controlled from the signal boxes and the operator will be able to cut out any section of the line when necessary. This method of contact is similar to that employed so successfully by the General Electric Co., in the installations on the East Weymouth, Nantasket Beach and Dorlin Hartford branches of the New York, New Haven and Hartford railroad. The method of traction, however, will differ radically from that used on the branches above mentioned. Instead of passenger carrying motor cars, with the motors mounted on the forward axle, locomotives similar in appearance to those used on the Belt Line Tunnel service of the Baltimore and Ohio will be used to haul the trains. The reason for this lies in the fact that the tunnel is only 11½ feet in diameter and that the bottom of the tunnel must accomodate the road bed. This materially reduces the clearance. The motors require to be suspended between 30 inch wheels, at least, to give the necessary clearance between them and the ground and this fact has brought about the locomotive in place of the passenger motor-car.

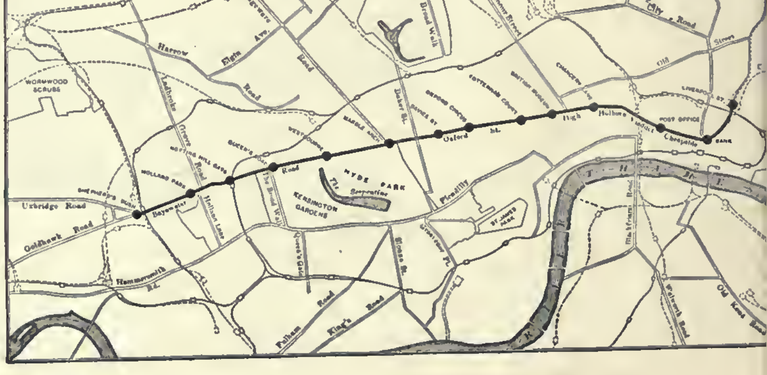
The total length of the road is six and one-half miles, from the station at Shepard's Bush to the Mansion House, or 13 miles of single track. There will be fourteen stations. In designing the line a decided departure has been made in the arrangement of the station approaches. As the Railway Company is not embarrassed by any considerations of grade, as in the case of surface railroads, the plan was adopted of making the road act as an auxiliary to the operation of the trains as well as merely to carry them. On each side of each station is a three per cent gradient rising on the approachng side and falling to the level of the road on the departing side. This unique method gives a retarding effect to all trains approaching the stations, equivalent to the application of considerable breaking power, while materially aiding in the acceleration of all trains as they leave the platforms. Furthermore, the saving in power necessary to secure the requisite rapid acceleration is by the adoption of this plan calculated to amount to about 33 per cent.

The schedule speed of the trains will be 14½ miles an hour, with stops at each station of 30 seconds. The trains will be run at first under a headway of two and a half minutes, which will be reduced as soon as the traffic demands a headway of two minutes.

The Generating Station will be located in the open air at the extreme western end of the line near Shepard's Bush Station. In building this the most modern American methods will be followed. The steam will be supplied from Babcock and Wilcox boilers, and the engines, of which there will be six, will be Horizontal Allis machines each of 1300 h. p.

The electrical system adopted is the three-phase alternating high voltage primary with reducing transformers and rotary converters, similar in general principle to that installed successfully by the General Electric Company for the roads between Lowell, Mass., and Nashua, N. H., and at Portland, Or., between Niagara Falls and Buffalo and on the line between Dublin and Dalkoy in Ireland.

The dynamos, of which there will be six, will each be directly driven by its own engine. These dynamos are of the newly developed rotating field and stationary armature



type. Each will have a capacity of 650 kilowatts. The speed of revolution will be 94, the frequency 25 cycles, and the initial voltage 5000 volts. The total capacity of the power station will be 5000 kilowatts or 6,800 h. p.

From the switchboard the current is carried to the converter substations, of which there are four. Two of those will contain seven step down static transformers, six for service and one in reserve, each of 300 kilowatts capacity, and two rotary converters each of 900 kilowatts capacity. The other two stations will contain four 300 kilowatt static transformers and one 900 kilowatt Rotary Converter. In the transformers the voltage of the current will be reduced from 5000 volts to 330 volts alternating, at which pressure it will enter the alternating side of the rotary converters, issuing from the commutator side direct railway current at 500 volts. The spare transformers mentioned above will be put into service when the headway of the trains is reduced. The static transformers are of the air blast type, the windings being cooled by air forced through them by a blower. The rotary converters will be similar in construction to those used at Niagara, Buffalo and Nashue.

The use of the sub-station method of electrical distribution ensures a uniform pressure throughout the entire length of the line. Fluctuation, therefore, which would materially interfere with the lighting of the station and trains, is reduced to a minimum. The limit of variation fixed by the Board of Trade, to the rules of which department all electrical installations in Great Britain must accord, is ten volts. With the method adopted in this installation, the variation in pressure will not exceed three volts.

The locomotives will number 35. Each will consist of a sheet iron cab containing the controller, indicating instruments, air brake, pump and controller, sand boxes, etc., mounted upon a locomotive truck. The motors have been especially designed for this work. They are of the gearless type and according to the new system of motor nomenclature adopted by the General Electric Company, are known as the G. E. 56. Four of these motors will be mounted on each locomotive, one to each axle, the total draw-bar pull being 14,000 lbs. The controllers will be of the series parallel type arranged for four motors. Each controller will embody the magnetic blow-out principle.

The weight of each locomotive complete will be thirty-five tons of 2,240 lbs. The trains will be made up of seven cars weighing when loaded, 105 tons additional, giving a total train weight of 140 long tons. The seating capacity is calculated at 336 persons.

Access to and exit from the stations will be effected by means of powerful high speed elevators. These will also be of American manufacturer and will be built by the Sprague Electric Elevator Co., of New York. The elevators will be forty-nine in number, each with a capacity of 15,000 lbs., or about 100 passengers per trip. The speed of elevation will be about 150 feet per minute. These elevators will be of the double drum type similar to those built for the War Department at Washington but of much higher carrying capacity.

It is estimated that the number of passengers that this road will carry per annum is 48,000,000, which at an average fare of 4 cents, will give an ample return to ensure dividends upon the capital stock.

Spokane, Wash.—Mayor Olmstead has received a proposition from Eastern parties to build a complete electric light plant to furnish the city with the same service they are now receiving, at the same price and at the end of a 10 years' contract to make the tax-payers a present of it in consideration of $1.

NEWS NOTES

POWER.

San Francisco.—The Westinghouse Company has installed a 5 and a 2½ h. p. motor in the Parrott building.

San Francisco.—Patrick & Co. have purchased for operating their tannery a 15 h. p. generator and a 37½ h. p. generator from the Westinghouse Company, also ten motors of various sizes. The Westinghouse Company has sold the Pacific Power Co. two 10 and a 15 h. p. motor.

Keswick, Cal.—The Mountain Copper Co. has purchased from the General Electric Co., a 17½ kw. generator and two electric mining locomotives.

Los Angeles, Cal.—The General Electric Company has sold an 8 h. p. motor to the Baker Iron Works.

Muhgan Bar, Cal.—The Hidden Treasure Gravel Mining Company has purchased from the General Electric Co. a 12½ k. w. generator and a 30 k. w. generator, and also an electric mining locomotive.

Tuolumne County, Cal.—Mr. Lindner states that he has taken up a water right on the Tuolumne river fourteen miles from Senora and expects to interest capitalists to put an electric power transmission plant. He has not given up his Merced river proposition, however, but is looking forward hopefully to the decision of the English capitalists who have the scheme under consideration.

Greenwood, B. C.—Joe Dandy Min. Co. have surveyors laying out ground for an electric plant, which will be erected by the Company.

Jackson, Cal.—The management of the Gwin mine will either put in a large compressor and convey the power back to the works to operate the pump and hoist at the new works or put in an electric plant and operate them with electricity.

Visalia, Cal.—Delta, June 8th.—Within six months the great Keweah Electrical plant is to be in operation. Arrangements have been perfected whereby work on the ditch and power plant will be commenced and rushed to completion as soon as possible. John A. Pirtle of Los Angeles, is one of the principle stockholders in the concern. The fact that Visalia will have electrical power will encourage the establishment of various kinds of factories. It is expected that 3,000 h. p. can be developed and transmitted to this city. Electric generators will be in the power house.

Salt Lake, Utah.—It is understood that the Galena Mining Co. is figuring with the mining machinery dealers for a hoist for the mine, in connection with which there is talk of a water wheel and dynamo on the creek in the Granite mountains, 20 miles NW. of Fish springs, for the generation of electric power for the operation of the hoist, and also for lighting purposes.

The recent hot weather has run the sale of fan motors up in the interior of Utah.

The Westinghouse Company has sold nearly four hundred during the past month.

Mr. Brayton, of the Pelton Water Wheel Co. has been dangerously ill, but is now, we are happy to say, out of danger.

Bossburg, Wash— Jonathan Bowen has acquired valuable property in the Eureka camp. Flumes are being built and water power will run the dynamo for electricity.

Jackson, Cal.—The Blue Lakes Water Co. has been granted the right of way, privilege and franchise to construct, maintain and operate one or more systems for generating, electricity and electric energy for light, power, etc.

Santa Barbara.—The Summerland oil men are thinking of having their oil machinery run by electric power, and have proposed to the Santa Barbara Consolidated Electric Ry. that it furnish them with power sufficient to run 6 10-h. p. motors. The oil men agree to pay $100 per month for the privilege.

San Bernardino, Cal.—The East Riverside Irrigation Co. is preparing to pump water for supplying its irrigation system, by electric power.

The Sacramento Electric Light and Power Co. has taken the first steps towards extending its wires to Woodland.

Tacoma, Wash.—According to John Brough Fife, the Treadwell Co. has purchased extensive properties in the Silver Bow basin and will operate same by electricity.

Chelan, Wash.—An electrical reduction plant is talked of for the Red Shirt Mine.

Jamestown, Cal.—The Jumper Co. has completed a new dam on Sullivan Creek from which power will be derived for the new electric plant.

Salt Lake, Utah.—Council Permission has granted the Pioneer Electric Power Co., to erect and maintain poles, wires, pipes, conduits, etc., in the streets of Salt Lake City for the distribution of electrical energy, and gas, to supply the city with heat, power, etc.

Redding.—The filing of the articles of incorporation of the Cosmos Land and Water Company in the counties of both Shasta and Tehama is creating some talk, as it is said that one of the purposes of the incorporation is to equip and operate an electric railroad. While the directors are from Los Angeles, some of the stockholders reside in San Francisco. Their articles are far-reaching and contemplate everything in the line of electric power.

Nevada City, Cal.—Harold Power, Supt. of the Hidden Treasure drift mine, is arranging to construct an electric plant.

Salt Lake.—A gigantic scheme, by which a single corporation will be enabled to control practically the entire output of electrical energy in Utah, is now upon the eve of consummation. If the scheme goes through, and the indications point to such an outcome, the Pioneer Electric Company of Ogden and the Salt Lake and Ogden Gas and Electric Light Company, the Citizens' Electric Light Company and the big Cottonwood Power Company of this city will be consolidated and operated by a single management. The consolidation will be effected by a transfer of the properties and franchises of the four companies to a new corporation, which will be known as the Consolidated Electric Light Company. The Pioneer Electric Power Company has constructed a pole line from Ogden to this city and recently secured a contract for lighting the streets of the city with 400 arc lights at $6 per light per month. The contract has been held for the past year by the Salt Lake Company and the big Cottonwood Company, at $8 50 per light.

E. O. N. Lehe is superintending the construction of a new electric plant on the Tuolumne River to supply a portion of the mother lode with light and power. The capacity of the dynamo will be 1,000 h. p.

Gen. Forman, a member of the Los Angeles and Kern River Electric Company, says that the Company is getting down to work, and that ten surveyors have gone to Kernville to locate the route of the canal from Kernville to a place 12 miles from Hot Springs Valley, and to locate the reservoir and power house sites.

Azusa, Cal.—Pomotropic,—W. H. Saunders, Consulting Engineer of the Crystal Lake Irrigation & Power Co., finds that he will have to divide the leads into two parts, placing one plant at point "L", where 619 h. p. may be obtained, and one at "N" where 866 h. p. may be obtained, making a total of 1,485 h. p. This 1485 h. p. is, after all, losses by friction in pipes. Estimated cost, $100,000. Mr. Saunders appears to have got things down very fine with his 619 and 866 h. p.

Riverside.—John G. North has filed on 1500 inches of the water in the E. fork of Snow creek, the purpose for which the water is claimed is to develop power for generating electricity. He has also filed on 2,000 inches of water in W. fork of Snow Creek, and 3,000 inches of water in Whitewater river, for the same purpose.

Riverside.—S. S. Thompson of Lake View has filed on 100,000 inches of water in Potrero Creek and will build a dam 300 feet high.

S. S. Thompson is a dam big—that is a big dam builder.

Azusa.—The Glendora Power Company has completed a survey of the San Gabriel River.

The Bullock Electric Manufacturing Company, Cincinnati, O., have just secured what is probably the largest order ever given for printing press equipment with electric motors, viz., the plant of the San Francisco "Examiner".

San Bernardino.—The capitalists who build the reservoirs in the mountains (The Arrowhead Company), will bring the water of the Mojave River through the range of mountains. The work is being pushed and will be ready for delivery by the spring of '98, for irrigation and with a fall of 3,000 feet for power purposes.

On the 20th of July, the stockholders of the Southern California Power Company will meet at their office in Redlands to vote on the question of bonding the Company for $500,000 to raise money to create a power plant for the purpose of generating electricity from the Santa Ana River, and to convey the electric force to market.

O. H. Ensign, chief electrician of the S. Cal. Power Company, has gone east, where he will supervise the construction of a large amount of machinery for the Company. He will also purchase large quantities of supplies.

Sonora, Cal.—A large mill is to be erected on the Patterson mine.

A new ten-stamp mill has been started at the Arbona.

There has been a big strike at the Mt. Jefferson mine near Greseland.

L. W. Howe is superintending operations on the south extention of the Arbona. Work on the 150 foot level of the Maryatt shaft is being pushed.

A big strike has been made at the Easton mine near Cherokee.

The contracts for the transmission of power of the river running through the Santa Ana Canyon to Los Angeles and Pasadena, a distance of eighty miles, was closed last month as reported. The details of the contract are as follows:

The wheels will be of the impact type, directly connected to the generators of which there will be four each of 750 kilowatt (1,000 h. p.) capacity. The contract has been let for three of these generators to the General Electric Company.

The Westinghouse Company will furnish three 250 k. w. step down transformers to reduce from 33,000 to 2,000 volts, also six 150 step down transformers.

A 300 h. p. synchronous motor, exciter, starting motor, switch board, panel, etc. Five 250 h. p. motors with outfit complete at the substations at Los Angeles and Pasadena.

The Westinghouse Company will also furnish a system of lighting protection for the plant.

RAILROADS.

Oakland, Cal.—It is said that North Berkeley is to have the electric cars of the Oakland Consolidated line. They will be extended from East Berkeley along either Milvia or Ocford St. Another projected improvement is the extension of the Telegraph Ave. line down to Shattuck Ave. The San Pablo Cable line is also to be extended. Electric power will most likely supersede the cable soon and the line will be extended to University Ave.

Los Angeles.—The reorganization of the Pasadena and Los Angeles Electric Railway has been practically completed. Cl. W. Smith, pres. The bond holders will be called on at once to furnish funds for the construction of local lines in Pasadena.

Los Angeles.—It is reported that upon the completion of the plant of the Southern California Power Company in Santa Ana canyon, the Santa Fe intends to operate electric cars upon its line from Los Angeles to Redlands and between San Bernardino and Riverside.

Pasadena.—President C. W. Smith of the Electric Ry., states that work will begin next week on the extension of the local lines.

Stockton, Cal.—Independent, June 22nd.—H. Kronthal, a New York capitalist, J. Brandenstein and L. P.Drexler, San Francisco capitalists, were in Stockton yesterday taking the preliminary steps toward building an electric car line in the NW. part of the city. In all probability work will begin immediately. The cost will be about $20,000.

Santa Rosa, Cal.—A meeting of the Board of Directors of the promoters of the Santa Rosa and Sonoma County Electric Railway will be held in San Francisco soon to take definite action regarding the beginning of the road. N. W. Griswold, Esq., of Kenwood, is one of the promoters.

Inc. Salinas Railway Co., formed to construct and operate street railways, railroads, wagons, etc. Principal place of business, Salinas City, Monterey Co. Capital, $100,000. Directors, J. D. Carr, F. H. Lang, et al of Salinas City.

The Council ordered the City Clerk to advertise for 30 days the application of the Salinas Valley Railway Company for a street car line franchise.

Honolulu.—There is a scheme proposed for an electric railway system for Honolulu. This time local capital only is concerned. Something like $300,000 has already been subscribed for the project, and this will soon be doubled. The new line will traverse Kapiolani Park and operate on city streets not now used by the London mule-car system. It is believed that there will be no opposition to such a franchise and that the project will be a success.

San Jose.—J. W. Findley and H. B. Alvord, receivers of the First-street electric road, have filed a petition for an order of sale. The road was the property of Jacob Rich, and Gus Lion, who is the assignee of Rich, and W. C. Andrews, who is assignee under Rich's insolvency, have filed objections. The receivers were appointed before Rich went into insolvency and have retained control of the road under an order of the court. Rich's personal liabilities were placed at over $700,000. He was president and chief owner of the road, but its liabilities are much less. Personal and corporate liabilities, however, are greatly entangled and litigation may result still further.

Los Angeles, Cal.—Officials of the Santa Fe system are on the ground making a personal investigation for the construction of a railroad to the Grand Canyon of the Colorado. The starting point is to be Williams on the Santa Fe Pacific.

San Rafael.—An application was filed with the trustees, asking for a franchise to operate an electric street railroad over the principal streets of San Rafael. At the next meeting of the County Supervisors application will be made to extend the road to Ross Valley, J. W. Hartzel, who built the San Mateo electric road, is at the head of the enterprise. Estimated cost of the road, including power, plant and rolling stock, is $13,000 a mile. $90,000 will be required to build the seven miles of road within the city limits of San Rafael and the line to Ross Valley.

Berkeley.—West Berkeley's prospects for a wharf and electric car line have unexpectedly brightened. At a meeting of the West Berkeley Improvement Club these subjects were discussed. It is proposed to organize a board of directors and incorporate with a view to securing the necessary capital. W. N. Heywood says that the establishment of the wharf means the subsequent establishment of an electric line between the east and west ends. He says a right of way for a wharf will be granted to the Company which will build.

Waterville, Wash.—A representative of an eastern firm recently visited here with a proposition to construct a standard guage electric railroad from Waterville west to Pine Canyon, from here the road can be extended ten miles farther to connect with the Great Northern at Rock Island, or the cars may be transferred across the Columbia at Wenatchee, either by cable or steam ferry. Power for operating the road would be obtained by developing the water power of the Entiat River.

Stockton, Cal.—Owners of property in the western part of the city north of Stockton channel are negotiating with the Electric Railroad Company for an extension of the road along Park or Flora Sts. to a point two or three blocks west of Edison St.

ELECTRICAL INDUSTRIES IN SAN FRANCISCO.

Electrical machine works, 3; men employed, 120; value, $100,000.

Electric lighting companies, 4; men and boys employed, 400; number of incandescent lights, 90,000; number of arc lights, 3,300; horse-power and motors, 1,300; coal used usually, 35,000 tons; value, $1,000,000.

Electric supply manufactories, 15; men employed, 120; value, $250,000.

LIGHTING

Grand Forks, B. C.—The city council is making arrangements to borrow $20,000 for city improvements, including a water system, electric light plant, and fire system.

Wilcox, Ariz., News, June 8th.—The Pearce Mine and Mill are soon to be lighted by electricity.

Manti, Utah.—The Electric Light Co. is contemplating some important improvements in the plant. It is proposed to move the plant where steam power will be available. (Pyramid.)

Palos Verdes Co., to deal in franchises, to generate and produce electricity, to build and operate lines of wire, etc., by J. Bixby, Geo. H. Bixby, R. H. F. Variel, et al. Principal place of business, Los Angeles. Capital stock, $400,000.

Vallejo Electric Light and Power Co. Principal place of business, Vallejo. Directors, J. Newman, K. Caspar, Vallejo, G. Breuner, S. F., et al. Capital, $100,000. J. Newman is of San Francisco.

Ferndale, Cal.—The Ferndale Electric Light Works is undergoing extensive repairs and improvements. The dynamo will be shifted, and the heater will be taken out and supplied with new tubes.

Santa Ana, Cal.—Santa Ana Gas and Electric Co. announces that it will reinstate the incandescent lighting system about September 1st. Newer and better machinery is to be put in so the arc system and incandescents can be operated at a reduced expense.

Phoenix, Ariz.—An electric light plant is being added to the mines of the Common Wealth Min. & Mill. Co. at Pearce.

Santa Rosa, Cal.—The Pacific Lighting Co., owner of the gas and electric lighting plant, has sold out to Philip Meyer of Alameda.

Independence, Ore.—Special committee in matter of purchasing electric light and water plants, reported that city could not afford to pay price asked. Report accepted and committee instructed to ascertain cost of duplicating said plant and report to council.

Eugene, Ore.—The Eugene Electric Light Co. are now completing arrangements for their new plant and power house. A large amount of the latest improved machinery has been purchased. The boiler room will contain three boilers, two of capacity of 100 h. p. each and the other of 60 h. p. When the new plant is put in they will be able if necessary, to furnish a maximum of 100 arcs and 2,500 of the incandescents.

Silverton, Wash.—The prospects are favorable for Silverton to be supplied with an electric light and power plant. C. W. Green of the Mt. Vernon Light & Power Co. has been there looking the ground over with a view to puttnig in a plant.

Idaho Falls, Idaho.—J. A. Tupper, of Salt Lake, is considering a proposition to erect an electric lighting plant at Idaho Falls.

We notice that a few weeks ago some seventeen boys were graduated from the electrical department of the Van Der Naillen School of Engineering, while two were turned out as X-ray experts. The field appears to be rapidly filling up.

Santa Rosa, Cal.—Judge Overton has given the order for poles, etc., for the proposed electric plant at the Home for Feeble Minded Children at Eldridge. The contract for putting in the system will be let soon.

Redwood City, Cal.—Geo. W. Fox read a petition from citizens relative to the town establishing and owning its electric light plant to furnish incandescent electric lights. He thought the cost of putting in a suitable plant would be about $2,500 or $3,000. The matter will soon take definite shape. Mr. Fox's thoughts may prove expensive to the city.

San Francisco.—The California Transportation Company has purchased a 7½ K. W. lighting plant from the General Electric Co.

Seattle, Wash.—Hamm & Schmitz have purchased a 12 K. W., G. E. lighting plant.

Los Angeles, Cal.—The West Side Lighting Company has placed a large order with; the General Electric Co. for transformers.

Ferndale, Cal.—The Westinghouse Company has sold a 60 K. W. alternating plant to the Ferndale Electric Light Co.

Fortuna, Cal.—Schwartz & Williams have purchased a 60 K. W. plant from the Westinghouse Co.

San Leandro, Cal.—R. S. Farrelley was awarded the electric light bonds, his bid being $10,355 and accrued interest from Jan. 1st, 1897, until such time as bonds are issued to him.

San Francisco, Cal.—Estimates have been prepared with the view of lighting the Presido reservation with electricity. The plan includes nterior and exterior lighting and embraces the officers' mess, the club-house, the post exchange, headquarters, the dwelling houses, barracks, offices, and all the walks, drives and avenues of the garrison and reserve.

Oakland, Cal.—City Electrician Carleton says that the fire and police telegraph system can be satisfactorily placed in the new district now annexed to Oakland, for $5,000. The electric light system can also be easily extended, for this year $15,000 is being saved over last year by a new system of lighting.

Lakeport, Ore.—Mr. Anthony, who contemplates putting in an electric light plant, has purchased land and commenced operations.

At the annual meeting of the Westinghouse Company it was announced that the St. Lawrence Construction Company of New York had awarded to the Westinghouse Company the contract for fifteen 5000 h. p. generators to be erected at Massena, Northern New York. This is the largest single order ever given for electrical apparatus, and the amount directly involved is about three-quarters of a million dollars.

This contract, together with that recently given by the Cataract Construction Company, of New York, for five 5000 horse-power generators for installation at Niagara Falls, New York, makes the total of twenty 5000 horse-power generators, having a total capacity of 100,000 horse-power, which have been ordered from the Westinghouse Electric and Manufacturing Company this year.

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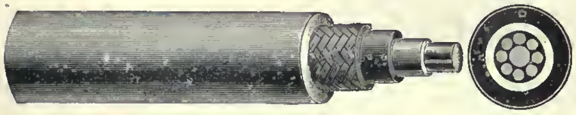

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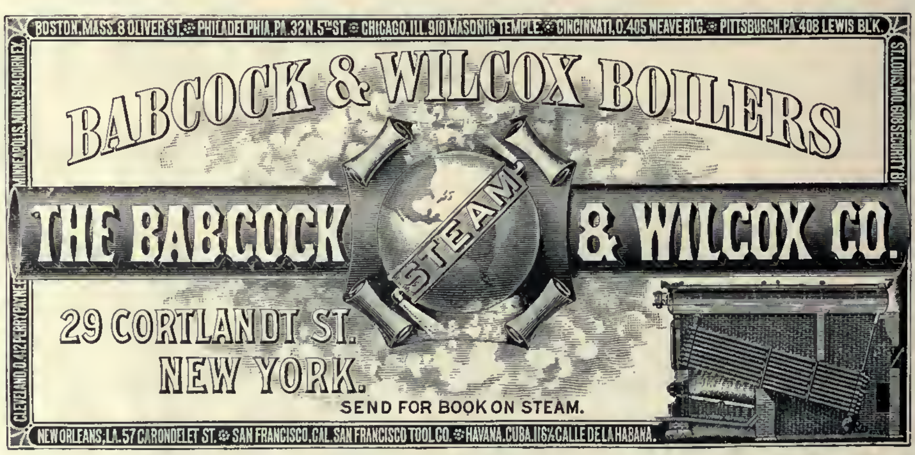

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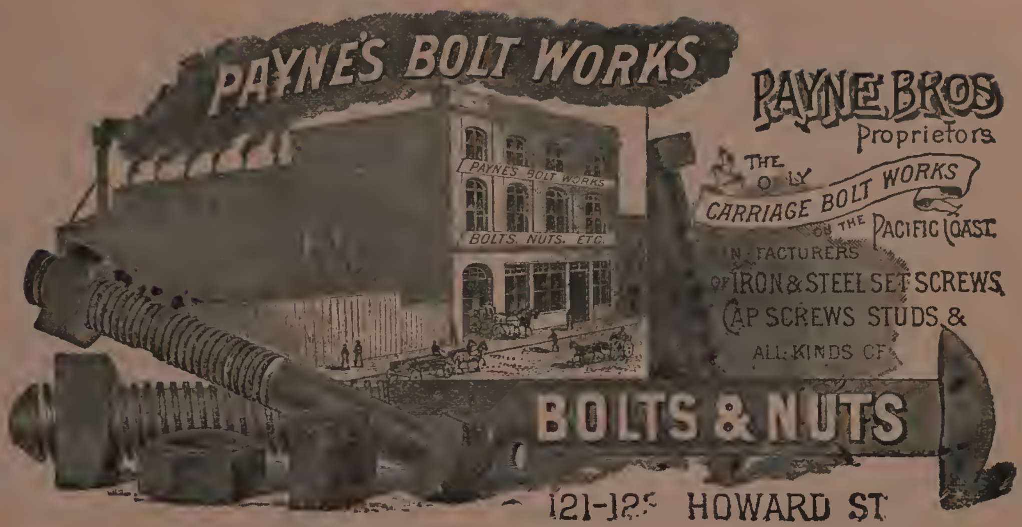
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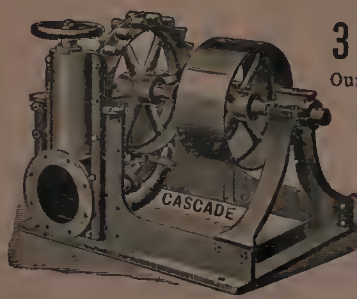

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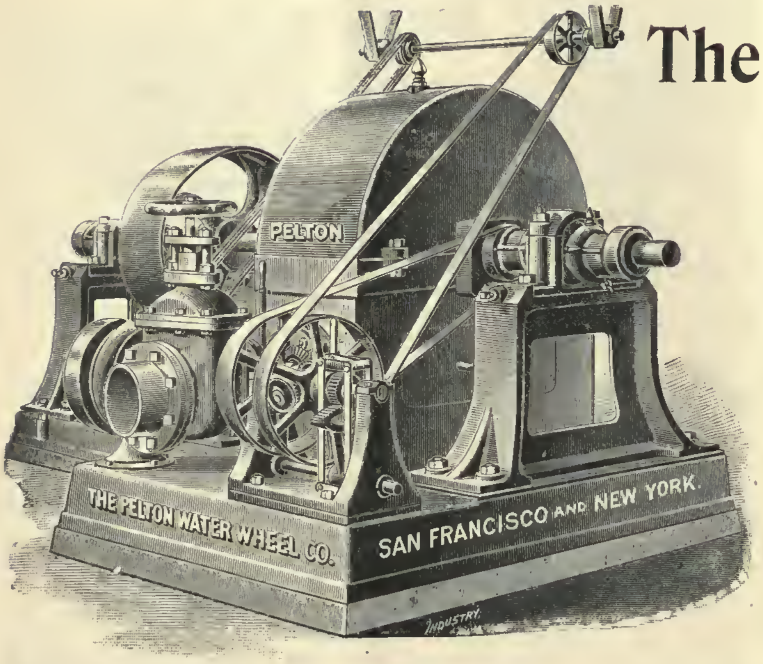
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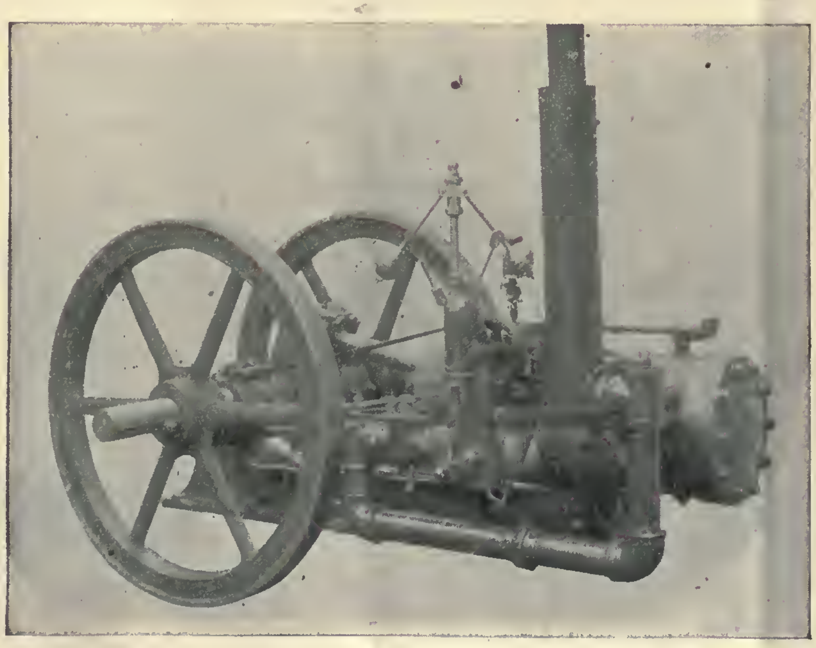

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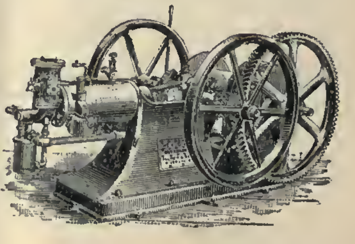


...THE...

PACIFIC ELECTRICIAN

VOL. XVIII. AUGUST, 1897 No. 8

THE POWER PLANT OF THE PIONEER ELECTRIC POWER COMPANY, OF OGDEN, UTAH.

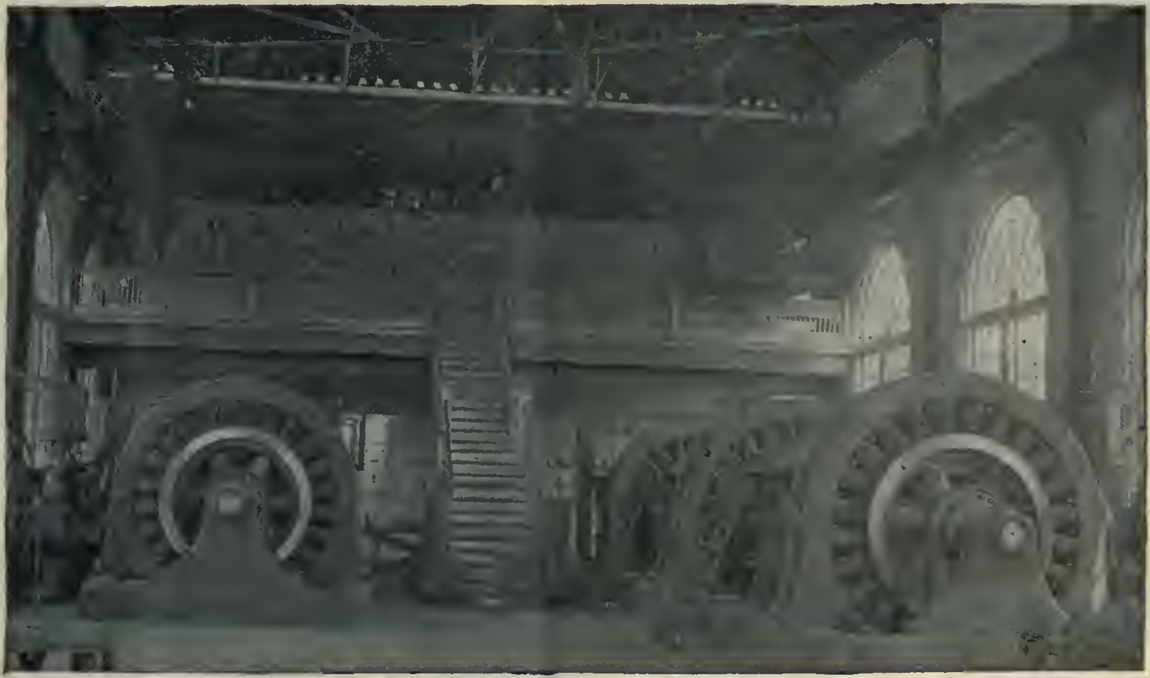
Among the sources of energy available for industrial purposes, natural water powers have long held an important place, and within the past few years, the progress made in the methods for converting mechanical into electrical energy, and the increase in the distance to which the latter can be economically transmitted, have led to the utilization of many water powers previously inaccessible. The advantages to any community of cheap and reliable power are so great that a steady growth of enterprises of this kind may be expected.

In the canon of the Ogden River, near the city of Ogden, the latest and most important hydraulic power plant of that State, and one of the largest works of the kind yet undertaken in this country, has been carried out during the past year by the Pioneer Electric Power Company of Utah.

The plans of the Pioneer Electric Power Company contemplate the utilization of the waters of the entire Ogden River water-shed above the mouth of the canon for the development of power as well as for irrigation. The central features of the plant are: A large storage reservoir and a masonry dam at the upper end of the canon; a pipe conduit 6 ft. in diameter; a power house with water-wheels and electric generators, electric transmission lines and substations for distributing the power to different points, and an extended system of irrigation canals.

The storage reservoir will cover an area of about 2000 acres, and will have a capacity of nearly 15,000,000,000 gallons. It will be formed by building across the canon, a short distance below its upper end, a dam of concrete masonry built up of isolated piers and arches founded on bed rock. The length of the dam on its crest will be about 400 feet. It will have a total height of 100 feet, 60 feet of which will be above the level of the present river bed. The up stream face is protected by a steel plate covering to prevent abrasion and percolation.

A 9-ft. tunnel, excavated through the solid rock around the south abutment of the dam, forms the outlet for the water of the reservoir. At its upper end it connects to a masonry inlet tower, which is in turn connected by a rivetted steel pipe 8 ft. 6 in. in diameter with the main gate house, 100 feet below the tunnel. This contains two 72-in. valves, one controlling the supply of the main conduit, the other discharging the surplus water.



INTERIOR OF POWER HOUSE.

The main conduit is a pipe line 6 ft. in internal diameter. Its total length is 31,600 feet, of which 27,000 feet is wooden stave pipe, and 4600 feet at the lower end rivetted steel pipe. It is laid in a trench 8½ ft. wide, and covered with earth to a depth of 3 ft. on top. The selection of smooth wooden stave pipe in lieu of steel pipe throughout was made on account of the greater cheapness of the former, as well as its less internal resistance to the flow. The pipe is laid along the side of the canon and follows the mountains to a point about half a mile beyond the mouth of the canon. It is built to conform to a hydraulic grade line of 2 ft. per thousand, a slope believed to correspond to the friction in the pipe. At the upper end of the pipe the inlet is funnel-shaped, and the wooden pipe is continuous except at three points where two rivetted steel elbows and a short length of tunnel are substituted. There are eight tunnels in the rock, the lowest being 667 feet. There are also eight steel bridges with a total length of 560 feet, besides a timber trestle. The maximum hydrostatic head in the wooden pipe is 117 feet, giving a pressure of 50 lbs. per square inch.

Making the Wooden Pipe.

From the end of the wooden pipe the steel conduit runs to the power house. The slope of this is quite steep and the pressure is from 50 to 200 lbs. per square inch. It is 60 ft. in diameter until it reaches a point 100 ft. from the power house, where it divides into two branches, 54 in. in diameter, which lead to two receivers, one on each side of the power house. There are 13 elbows in this pipe and its entire weight is over 2,500,000 lbs. The total efficient head from the flow line of the reservoir, when it is full, to the center of the receiver, is 446 ft.

All the steel pipe sections were rolled and rivetted at Ogden, in a shop built and equipped with machinery for that purpose. This was done in order to escape the heavy railroad charges which would have been necessary, had the rolled sections been built at the works. The building was equipped with all the machinery necessary for rolling, punching rivetting and calking the pipe sections, and an air compressor by which the rivetting and calking machines in the trench were driven. After about July 15th, 1896, when the first plate was punched, the work was carried on night and day and seven days in the week. The steel pipe, after it had passed the riveting machines, was given a prolonged bath in asphalt.

The rivetting of the pipe in the trench was effected by power rivetters, operated by compressed air at a pressure of from 50 to 75 lbs. 500 rivets per day of ten hours were driven by each machine. At the steep grades of the steel pipe line it is anchored by means of concrete anchorages built around it 8 ft. by 10 ft. in section and 10 ft. long.

The wooden pipe is built up of Douglas Fir staves, tongued and grooved, 32 in. the circumference, 16, 18 and 20 ft. lengths and 2 in. thick. All the staves were planed and dressed in a special mill erected near the mouth of the canon. The pipe was laid upon sills set in the trench, and was banded with round steel rods ⅝ in. and ¾ in. in diameter, the latter being used where the pressure exceeds that due to a head of 100 ft. In order to bring the staves to the non-inaccessible parts of the canon, a cable way 1000 ft. long, erected on framed towers, was built.

Between the inlet tower at the dam and the power house, there are five large gate valves, beside the smaller blow-off and relief valves. Three are 5 ft. in diameter, the other two 42 in. The first two of the larger ones weigh about 23,000 lbs. each, and are in the gate house, the third is placed near elbow No. 2 of the steel pipe line, about 100 ft. below its junction with the wooden pipe. Its purpose is to permit the closing of the wooden pipe to keep it full of water even when the steel pipe is empty. The head at this point is about 200 ft. The valve has only a single valve stem and is operated by a hydraulic lift supplied with pressure water from the main pipe above the valve. The total weight of this valve is 52,000 lbs., the heaviest single piece in it weighing about 20,000 lbs. Besides these large valves there are two smaller, each 24 in. in diameter. These are placed between the lower end of the 6 ft. pipe and the power house in the 54 in. branches leading to the receivers. These branches are reduced to 42 in. by the use of Venturi meters, thus permitting the use of the smaller valves, which are operated by hand. The pipe is fully provided with air, mud and relief valves. The connection between the main pipe and the branches is made by a breeches casting secured to the steel pipes by cast steel angle flanges and bolts. To withstand the great longitudinal pressure, a heavy concrete block is built around the casting.

Of the nine bridges, the longest is that over the Ogden River. This is a rivetted bow string girder 75 feet long. The other bridges carry the pipe line over lateral ravines or were built in place of masonry retaining walls, where a steel structure was cheaper.

The power house is built of pressed brick, with concrete and rubble footings, and cut some trimmings. Its outside dimensions are 135 feet in length by 50 feet in width. The roof trusses are of steel, and are supported on steel posts imbedded in the brick walls. A traveling crane of 15 tons capacity, operated by hand power, traverses the building, the track girders being carried by the steel posts. This building contains all the hydraulic and electric machinery

Pipe Line Along Side of Canyon.

used. A smaller, separate building serves as a machine and blacksmith shop.

The water is delivered from the pipe conduit into two receivers, buried in the ground, one at either side of the power house. They are 6 feet in diameter, and, in their general appearance and the material used, closely resemble the regular steel pipe conduit, the thickness of the metal, however, being increased to ⅞ in. in order to allow for the water-hammer.

The receivers are provided with five safety valves each, which discharge when the pressure exceeds 200 lbs. per square inch, and an outlet gate at the bottom. From each of these receivers, five 30 in. and one 10 in. intake pipes extend to the walls of the power house to connect with the water-wheel nozzle pipes. Between those intakes and the nozzle pipes are placed the following valves in the order named: One 18-in. geared gate valve, one 18-in. hydraulic gate valve, and one 18-in. Butterfly valve.

TRENCH IN OGDEN CANYON.

The 18-in. geared gate valve is only to be used in case of repairs to the particular machines that govern it. The 18-in. hydraulic gate valve is piped up to a small D. valve, which is placed back of the switchboard and under the floor. By means of a lever on the switchboard connected to this D valve, the gate can be opened or closed at the operator's will. This valve is the one which is to be used for starting or stopping a wheel. The 18-in. butterfly valve is operated by means of a worm gear from the governor, and is used in checking the speed of the wheel by reducing the head or pressure near the nozzle and thus avoiding a sudden fall of head in the main pipe line which would be detrimental to the proper working of the plant.

The nozzle for the water wheels has six rectangular openings or ports 1-11-16 x 3½ in. in area, of which the operator is able to close one or more as he may desire. The levers that operate the hydraulic gate and nozzle are placed near the top of the switchboard. The set of levers for each water wheel is placed in the panel governing the generator which is driven by the wheel in question, so that the operations required in starting or stopping these machines are reduced to a minimum. The wheels are of the impulse type directly connected to the generators. The complete plant will consist of ten units, five being already installed. The power house and receivers being built for the ten, the balance can be readily installed at any time.

The Knight water-wheels are 59 ins. in diameter, and have 45 bronze buckets cast in one solid piece; 14 of these will, when the nozzle ports are all open, receive the water at the same instant. The centers of the wheels are made of cast steel, the buckets being pressed on these steel centers and secured with bolts. These wheels are keyed to the generator shaft. Each wheel has a capacity of 1200 h. p. at 300 revolutions per minute, and each is provided with two fly-wheels, about 70 ins. in diameter, each weighing about 2 tons.

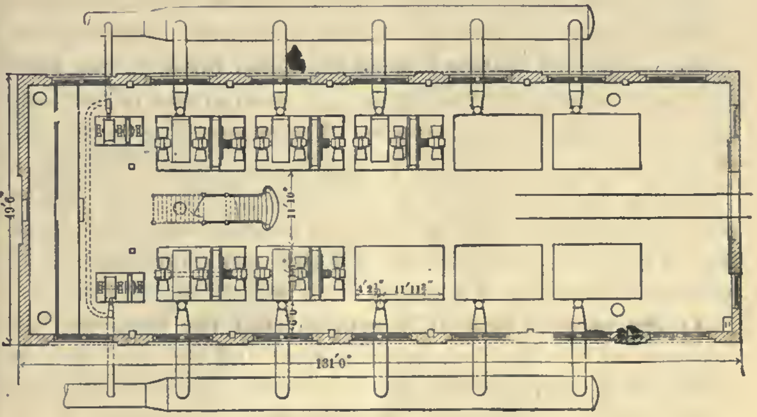
The armature, armature shaft, two fly-wheels and one water-wheel, which comprise the moving parts, weigh 15 tons. This allows a uniform speed to be maintained notwithstanding changes of head in the main pipe, or changes in the generator load. The water-wheel, fly wheels, nozzle and the two hydraulic cylinders controlling the nozzle ports are encased in a steel housing, bolted to the machine bed-frame.

Between the two lines of machines and down through the center of the building underneath the concrete floor is the spillway into which the wheels discharge the water, and through which the water is carried back to the river from which it is taken.

The generators used in this plant are of the General Electric Co. three-phase type, with 24 poles, and at 300 revolutions per minute, have an output of 750 k. w. at 2300 volts and a frequency of 60 cycles per second. The factory tests show that the variation in volts will be less than 5 per cent with a constant speed, should the full non-inductive load be thrown off or on.

Between the machine foundations and the building foundation wall, on each side of the building, is a subway which runs the entire length of the building and across the rear and in this subway are carried all the necessary piping for water-wheel controllers and all the wires between the generators and the switchboards. The cable connecting each generator to its respective panel on the generator switchboard is a three-wire concentric 250,000 C. M. lead-covered cable, and the exciting wires are a two-wire concentric No. 4 B & S lead-covered cable.

The exciters used on this plant are G. E. six-pole 500 volt machines, and will give 100 k. w. at 550 revolutions per minute. Each of these machines is ample for the entire exciting current that will be needed for the ten 750 k. w. alternators, and they are each direct connected to a 135 h. p. Knight water-wheel, similar to the 1200 h. p. water-wheels previously described. These exciter water-wheels are cross-connected to each receiver, so that either exciter can be operated from either receiver.



PLAN OF POWER HOUSE.

The generator switchboard consists of seven marble panels; five for the alternators, one for the exciter and one for the instrument panel.

These panels are 26 x 90 ins. each. They are built up of blue Vermont marble, with nicket fittings. There are two

(Continued on Page 90.)

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Vol. XVIII. AUGUST, 1897. No. 8

BUSINESS PROSPECTS.

While considerable business, in the aggregate, has been done in the electrical field on this Coast during the first half of the present year, still things have been rather quiet.

There is every reason to believe, however, that the last half of the year will see a revival that will make things hum.

The electrical business, like all other lines of trade, depends in the long run on the general prosperity of the country.

During the past four years of trade depression, prices have been cut down very close to the margin of cost, while the sales have been in great part made up of electrical machinery that has displaced other machinery because of its greater economy.

This is especially marked in the matter of power transmission plants and the use of electric motors. While a certain amount of railroad work has been done, it has been comparatively small, for capital has been afraid to take any chances in building new roads. The same thing is true, although not to such a marked degree, in electric lighting.

People have not cared to put money into new enterprises and have, as far as possible, avoided renewals, in order to keep down expenses. All this was characteristic of a falling market and a period of business depression.

At the present time it is evident that the business depression of the last four years is past and that we are entering on a period of rising prices and business prosperity.

The Pacific Coast appears singularly fortunate in its outlook for the future.

It is an axiom of economics that when the producing classes are prosperous business is good in all lines of trade.

At the present time, owing to high prices and good crops, the farmers and fruit growers are all making money.

A moderate estimate shows that the wheat and barley crops will put into the pockets of the farmers of California over $50,000,000, which is some $15,000,000 to $20,000,000 more than they received last year. This excess, due to higher prices, is all profit. The fruit and grape crops this year are larger than ever, and the prices are good, so that the profits will foot up to many millions. The production of gold in California has been steadily increasing and this year will go very close to $20,000,000. The result is that the great producing classes, for the first time in five years, are prosperous.

In addition, to this the tariff question is settled, and settled very favorably to California, while the discovery of rich placer mines in the Klondyke region promises to put millions of money incirculation, and create an unexpected demand for products and supplies of all kinds.

In the course of the next month or two millions of dollars will begin to pass from the producing classes, to the dealers and banks and through all the channals of trade.

Confidence will be restored, money will be plentiful and business enterprises of every sort will start up.

In the electrical field we look for a great extension in railroad work, not only in the towns and cities, but throughout the thickly settled fruit district of Santa Clara, Sonoma and Napa counties, and also in the orange growing portions of Southern California.

There is also certain to be a great increase in electric lighting plants, while the application of electric power will go on with increasing rapidity.

It has been a long pull and a hard pull, but we seem to have got to the top of the hill at last.

THE SOUTHERN CALIFORNIA POWER TRANSMISSION PLANT.

We notice in the various electrical journals of the East the following item:

"A contract for the transmission of power of the river running through the Santa Ana canyon to Los Angeles and Pasadena, a distance of 80 miles, has been concluded between the Southern California Power Company and the General Electric Company. The amount of power to be transmitted at first is 4,000 horse-power. The station will be located in the Santa Ana canyon, 12 miles from Redlands and about 80 miles from the towns in which the electric power will be utilized."

This statement is not correct—the General Electric Co., has closed no such contract.

The Southern California Power Co., let two contracts for electrical apparatus for its transmission plant. The main contract involving the bulk of the apparatus went to the Westinghouse Company; this contract included the step up and step down transformers, all the motors for the entire system, complete equipment for the sub-stations at Los Angeles and Pasadena, and a specially devised method for lightning protection. The General Electric Company's contract was for the generators.

The pole line is to be constructed by the Southern California Development Co. The Stanley Company made a clean, hard fight for the job and came within an ace of getting away with the entire contract. As it was the Stanley Company carried off the honors by forcing the adoption of the inductor type of generators—the generators for which the General Electric Company has the contract will be the first ones of that type that it has ever built.

In view of all these facts, it is certainly a mistake to give the General Electric Company the credit of receiving the contract for the Southern California Power Plant.

Mr. Sessions, who has been manager of the Electrical Engineering Company since its organization, is no longer connected with that company.

THE ARC LIGHT PLANT FOR GOLDEN GATE PARK.

In our July number we published a general statement to the effect that "Two 80 light machines to operate 40 arc lights, allows a fine, wholesome margin as a reserve."

As an abstract proposition this would appear to be above criticism, but one of our valued subscribers has sent us the following communication:

"I notice in the copy of your paper, just to hand, that you make a statement in regard to the Arc Light Plant at the Park, which is erroneous, and should be corrected.

The dynamos that are put in are machines that are built to run 40 lights at 400 revolutions, and, therefore, are the proper size for the work they have to perform.

I think if you give the matter a little consideration, you will see that if it were possible to run any dynamo at double the speed of which it was constructed, it would double the capacity, and your informant, evidently, is not aware of the conditions ruling.

Please correct this in your next issue.

Yours truly, ————."

We did not mention the Park plant in any way, at the same time we are glad to know it is all right and we are entirely willing to admit that two 40-light machines is a very reasonable outfit.

A machine that at 800 revolutions furnishes 80 lights is an 80 light machine, but when run at half that speed it is a 40 light machine. We understand that in the case of the Park plant it was considered most profitable to operate at a speed of 400 revolutions, and as the Park Commissioners were the ones to decide what were the conditions under which the plant was to operate, that settles the matter.

The ground for misunderstanding undoubtedly arose from the fact that the Fort Wayne people who sold the machines speak of them, no doubt inadvertently, as 80 light machines," which gave a wrong impression.

The contract that was recently closed between the San Francisco Gas and Electric Co., and A. E. Brooke-Ridley for a chloride battery plant for central station work in this city, is worthy of note, as it is the first plant of the kind on the Pacific Coast.

We understand that another central station battery plant is to be put in in Los Angeles, and it will not be long before a storage battery plant is recognized as a necessary adjunct for every central station.

STATIC SPARKS.

The overland train from the East was thrown from the track near Reno, Nevada, last month and considerable damage was done. Mr. Elder's wonderful nerve carried him safely through, although most of the Indians on the train were more or less severely injured.

The "Electrical Review" gives D. McFarline Moore, "the marble heart" in regard to his vacuum tube experiments. The trouble with Moore is that he has been poaching on the Tesla preserves. Great is the "Electrical Review" and Tesla is its profit.

Berth Groote of Nurnberg, Germany, has written us a letter asking us to give him a free advertisement of a patented device which he hopes to sell to confiding Americans. He closes his appeal for aid in the following manner: "Believe me, dear Sir,

Yours, respectfully,
BERTH GROOTE."

Go to, Berth Groote, are there not suckers enough in Nurnberg that you wander so far from home?

We notice that Dr. Cornelius Herz of Panama Canal infamy has asked the State Department at Washington to present a demand on the French Government for damages.

The alleged damages arose from the efforts of the Frenchmen to get the elusive doctor into custody in order that they might try, condemn and sentence him for his crimes.

Dr. Herz was one of the early electrical men of San Francisco and when he left his friends mourned their loss, which in one instance ran up into the thousands. Cornelius is a sly bird, but he never loses his nerve.

The Los Angeles "Herald" says:

"The San Gabriel Electric Co., of which W. G. Kerchoff is the head has secured rights covering the use for power of the waters of the San Gabriel, and before long will have a long distance plant in full operation for the production of power and the various forms of electricity. It is expected to conserve about 4,500 h. p."

According to Webster "conserve" means to "keep entire, to retain, to preserve in sugar." As there is not water enough in the San Gabriel during the dry season to generate much over 700 horse-power, we never understood before just what the San Gabriel Electric Co. expected to do. Now that we know the power is to be conserved it is all clear.

We see that the Redondo wave motor is having extra heavy piping put in. When that is done it will at last operate successfully and run a dynamo. It is odd how there is always just one thing more needed to get that wave motor going.

OGDEN ELECTRICAL POWER PLNNT.

(Continued from Page 87.)

sets of three-phase bus bars on the back extending the entire length of the seven panels, as well as two bus bars, also running their entire length, from which the exciting current is taken.

From the generator switchboard the current is carried to the distributing board over copper bars, of which there are two sets of three, connecting the two sets of bus bars on the generator board with the two sets of bus bars on the primary panels of the distributing boards.

The distributing board is in gallery in the rear of the building and over the generator switchboard. Back of this distributing switchboard are nine 250 k. w. air blast step-up transformers, the lightning arresters and the two blowers for cooling the transformers. The distributing board is divided into two sections—the primary section, and the secondary section. Each section has six panels. In the primary section, four of the panels are for the low tension side of the step-up transformers, the remaining two being for the local distributing lines in the vicinity of the power plant. In the secondary section, four of the panels are for the high pressure side of the step-up transformers, and two for the long distance transmission lines.

Back of the distributing switchboard and on a raised platform are placed the step-up transformers. These transformers raise the potential of the current from 2,300 to 16,000 volts, at which pressure it goes on to the long distance transmission lines. The transformers are connected up in sets of three, the delta connection being used on both sides. At each end of the building in the gallery are paced the two blowers, direct connected to a 2½ h. p. 500 volt direct current motor. These blowers are used in cooling the step-up transformers, and force the air up through the bottom of the transformers, around the coils and out at the top.

The transmission line is calculated to deliver about 3000 h. p. at the sub-station in Salt Lake City, distant about 38 miles, and consists of two circuits, making six wires of No. 1 B & S gauge.

The poles used on this line are of Oregon cedar, and are good, clear, straight poles, 30, 40, 50 and 70 feet long, with 9 in. and 10 in. tops. There are two cross arms on each pole for the wires; two wires are on the top arm 4 ft. apart, and four wires on the bottom arm each 2 ft. apart, a circuit being on each side of the pole. These wires are so arranged that should a plane be placed perpendicular across the circuit it would show an equilateral triangle, with a wire at each angle, the length of the sides being 2 ft. These wires are transposed about every half mile. By this arrangement of the pole line wire, the inductive effect is reduced to a minimum.

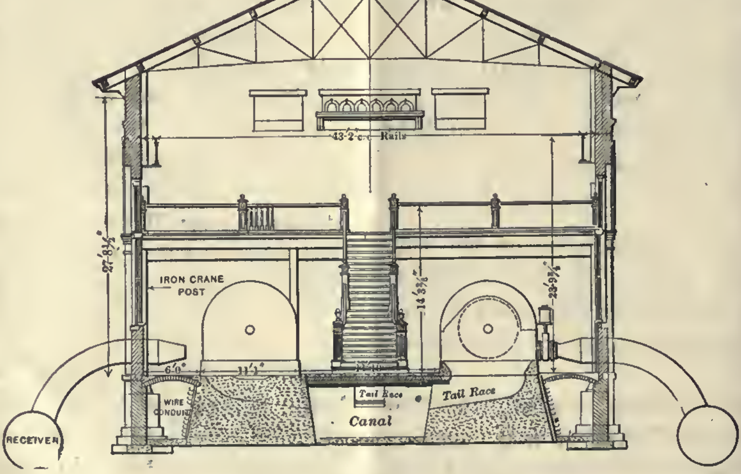
About six feet below the second cross arm on the pole is a two-pin cross arm, on which the telephone wires are strung, being transposed about every four poles, there being an average of about 50 poles per mile.

The current is fed into the transmission line at the power plant at 16,100 volts and delivered to the step-down transformers at 13,800 volts. This will give an energy loss of about 10 per cent in the line, and a potential loss of about 14 per cent. The sub-station step-down transformers deliver this current to the local distributing lines again at 2,300 volts. There are at present nine 250 k. w. step-down transformers at the sub-station connected by the step-up transformers, and the switchboard in the sub-station is similar in every respect to the distributing board in the power plant gallery. The cooling apparatus here is also identical with that used in the power plant, except that the motors used are 60-cycle induction motors.

While the transmission lines are at present capable of delivering 3000 h. p. at the sub-station, with a 10 per cent energy loss, if it should become necessary, the step-up transformers can deliver more than this by changing three wires on their high pressure side, and delivering the current into the transmission lines at 27,000 volts. Thus the line capacity would be more than doubled.

The present installation of the power plant is capable of delivering 3750 k. w. to its lines, but ample provision has been made to increase this amount to 7500 k. w. by installing five more 750 k. w. machines, as new industries or manufacturers spring up as the result of the advantages offered to them in Ogden and Salt Lake City.

There is one important feature in the arrangement of the machinery which should be noticed, viz., the complete duplication of all parts. All portions of the plant below the breeches pipe casting, at the lower end of the 6 ft. conduit, are absolutely symmetrical about the center line of the power house, each side being entirely independent of the other. This applies not only to the pipe and the receivers, but to all the parts of the switchboards, etc., as well as to the generators and water-wheels. Either one of the ex-



Section of Power House.

citers, also, is capable of providing sufficient current for all the large generators, and can be run with water from either receiver. The advantage of this arrangement is that an accident to either receiver, or to one or more wheels or generators, would not result in the shutting down of the entire plant, but at the most of only one side. For a short period all the required power could probably be supplied from one side of the power house.

EXTERIOR OF POWER HOUSE.

The current will be used to drive factories, running electric railways from Ogden to Salt Lake City, to the Lake, to the Springs, and to light the towns and cities in the north of the State. The surplus water in the storage reservoir will be utilized to irrigate large tracts of land in the vicinity.

The Pioneer Electric Company was organized November 27th, 1893. The president and treasurer of the company is the Hon. Geo. Q. Cannon, the intellectual and diplomatic head of the Mormon Church. The general manager is Frank J. Cannon, son of the president, and U. S. Senator from the State of Utah. The directorate consists of Wilford Woodruff, president of the Mormon Church; Joseph F. Smith, one of his counselors; F. D. Richards, one of the apostles; Asahel Woodruff, and A. B. Patton, president of the Ogden Chamber of Commerce. Mr. Patton and the chief engineer and secretary, Mr. C. K. Bannister, are the only men among the directorate, not members of the Mormon Church.

The conception and successful completion of the works belonging to the Pioneer Electric Power Co. are largely due to the efforts of C. K. Bannister, M. Am. Soc. C. E., who, as chief engineer and secretary of the company, has devoted several years to the careful study of the engineering and financial problems involved. Preliminary surveys were made in 1894 and 1895, but it was not until the beginning of 1896 that the location of the plant was definitely settled and actual construction begun.

A new Company is in the field, headed by Mr. Drecksler, the San Francisco millionaire, and Mr. Lloyd of Riverside, who propose to put in an electric plant. Preliminary surveys have been made by O. G. Newman of Riverside for taking the water out of Bear Creek, near Corkscrew falls, to generate power that will run large dynamos, and generate electricity that will be transmitted to Los Angeles and other towns in Southern California.—Exchange.

Mr. Drexler seems to have discovered a new way to spell his name at the same time that our Mr. Lloyd changed his residence to Riverside.

We have been given to understand that the Southern California Power Co., had secured control of all the water powers in that end of the State; perhaps, now that they see their mistake, they will find it worth their while to buy out Mr. Drecksler and Mr. Lloyd of Riverside. We wonder whether it was a mere coincidence that these gentlemen should have hit upon Corkscrew Falls! The name seems singularly appropriate.

The General Electric Company of New York has brought suit in the United States Circuit Court against the Tuolumne County Electric Power and Light Company and against William Grant and J. J. Crooks for electrical machinery delivered at the Rawhide mine and in other places in Tuolumne county. The suit against the Electric Power and Light Company is for $8028.55 alleged to be due on a plant established at the Rawhide mine on August 1st last. The suit against Grant and Crooks is for $12,250 alleged to be due on electrical apparatus delivered and set up near Columbia on April 1, 1896.

The Joshua Hendy Machine Works are pushing a special department for electric railway, light and power supplies and has secured a number of valuable agencies.

The inductor type generators that the General Electric Co., is building for the Southern California Power Co., will be of cast steel and will weigh 90,000 lbs. They have one armature and two field coils and will run at speed of 300 revolutions.

Mr. Pardee, who came out from the Fort Wayne offices in the East to look after things at the agency here, has gone back again after a short stay.

Harry Russell, who recently left the General Electric Co., has decided to go to Mexico on a mining proposition.

Jno. Martin of the Stanley Co., has been East on business connected with an important power transmission scheme.

The Central Light and Power Company has filed articles of incorporation.

This new company announced that its principal place of business is San Francisco, and its business will be the furnishing of electric light and power throughout the city.

The directors are Frank Pauson, who subscribed $15,000; C. L. Ackerman, $15,000; Joseph Naphtaly, $10,000; A. E. Brooke Ridley, $2,500; Joseph M. Loewe, $3,000; Samson Gerst, $2,500; J. W. Pauson, $2,500. The capital stock is $1,000,000, divided into 100,000 shares of $10 each, and the total amount subscribed $50,500. This company has leased the Emporium electric plant.

The "News" of Yreka, Cal., said the middle of last month:

"A further fall in the Shasta river will interfere with the power of the electric light plant. As it is the pumping plant of Simmons & Hunter cannot be operated."

This is in line with other reports that go to show that in most parts of the State the water supply is lower than it has been for years. As a consequence, there is likely to be trouble for some plants whose supply is not overabundant.

The Folsom plant ran pretty close with its water last fall when it was not a very dry year, and there are others.

We see our old friend, Col. Hartzell is working up electric schemes in various portions of the interior of the State. The Col. was the promoter of the San Francisco and San Mateo Electric Railroad which was such a great success that the bondholders hardly got car fare out of it, while the stockholders were glad they escaped with their lives. The railroad is still there however.

We notice that a Mr. Geo. H. Chick is operating near Alberquerque, N. M., with a so-called Edison Electric Gold Saving Machine, of which he is the inventor.

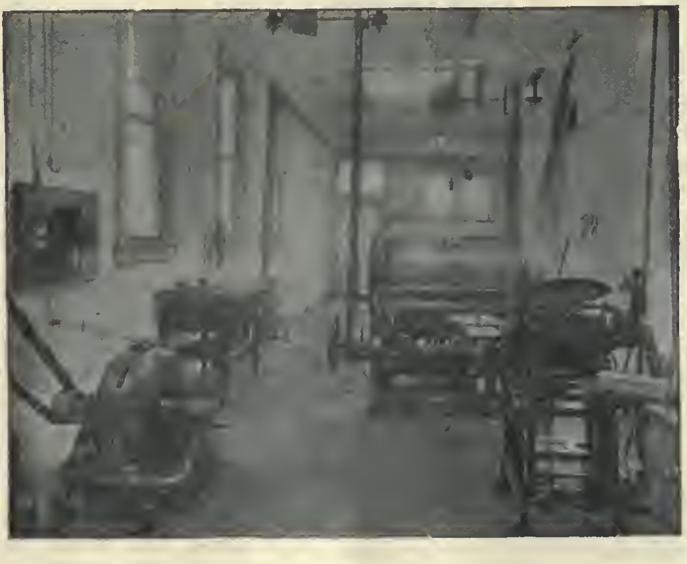
We do not know whether this is the same Geo. H. Chick, who a few years ago was in the habit of erecting smelting works at various points in California, Oregon and Washington.

He never actually completed any of his smelters, and he never went back again to a town where he had been before as there seemed to be a prejudice against him.

If it is the same man, his Edison Electric Gold Smeling machine will bear close watching.

PRINTING PRESSES AND ELECTRIC MOTORS.

The printing presses of Day and Joy, in Sacramento, are driven by motor. The motor is a 10 h. p. of the General Electric three-phase induction type, without brushes, collector rings or wiring contacts. It was one of the first in the city to take the current of the long distance transmission. The motor now drives one four-roller Huber cylinder press, one Cottrell press and two job presses, and although it has been in use a number of months has not involved the firm in a cent for repairs.



10 H. P. G. E. INDUCTION MOTOR IN PRINTING OFFICE OF DAY & JOY, SACRAMENTO.

NEWS NOTES

POWER.

Mr. Lloyd of the Fort Wayne Co., has, during the past month purchased from the Westinghouse Co., a two 5 and a 7½ h. p. Tesla motor.

Los Angeles, Cal.—The Westinghouse Co., has sold a 10 h. p. motor to the Machinery Supply Co.

San Francisco, Cal.—The Westinghouse Co., has sold to Holbrook, Merrill & Stetson, a 15 h. p. Tesla motor.

Honolulu.—The Westinghouse Co., has shipped to Honolulu a 100 k. w. generator and a 75 and 2½ h. p. motor.

San Francisco, Cal.—The California "Demokrat" has purchased a 8 h. p. Westinghouse motor.

Prescott, Arizona.—The Westinghouse Co., has sold a 10 h. p. generator and a 7½ h. p. motor to the Security Mining and Development Co.

San Francisco, Cal.—The Pacific Power Co. has purchased 7½ h. p. Westinghouse motor.

Fresno, Cal.—The Westinghouse Co., has shipped a 15 h. p. Tesla motor to Fresno.

Los Angeles, Cal.—Julius Hansen has purchased a 30 h. p. General Electric motor.

Riverside, Cal.—L. B. Brown has purchased a 5 h. p. General Electric motor.

San Francisco, Cal.—The San Francisco Gas and Electric Co., has purchased from the General Electric Co., four motors, ½, 1¾, 3 and 10 h. p.

San Francisco, Cal.—The General Electric Co., has sold the Southern Pacific Co., a 50 h. p. motor, two 5's and a 20.

San Francisco, Cal.—The Pacific Power Co., has purchased a 10 h. p. motor from the General Electric Co.

Portland, Or.—The Portland General Electric Co., has purchased a 5 h. p. motor from the G. E. Co.

San Jose, Cal.—Jno. Mignola & Bros., has purchased a 1¾ h. p. G. E. motor.

Petaluma, Cal.—The General Electric Co., has sold to the Petaluma Electric Light and Power Co., 1, 2, 1¾ and 5 h. p. motor.

Pasadena, Cal.—A. B. Hogan has been awarded the contract for construction of the East Side electric loop of the Pasadena and Pacific line on South Los Robles, California and Lake avenues.

Bakersfield, Cal.—R. D. Holabird intends to sell another cold storage plant for M. M. Ode, who was recently burned out. Electric power will be used. Graves and Baker will also apply electric power to their cold storage plant.

Riverside, Cal.—Prof. Baldwin of Pomona College proposes to use the Mill creek canyon waters near Perris to furnish electricity to Lakeview, Hemet, Perris, Moreno and Alesandro. He wants to secure contracts for power to aid his Company in floating bonds.

Pasadena, Cal.—David Smythe has completed the model of an electric stamp mill. Several Pasadena capitasts have become interested.

Los Angeles, Cal.—L. P. Hansen & Co., to deal in real estate, electricity, etc. Capital stock, $200,000. Directors, L. P. Hansen, M. E. Wood, C. M. Simpson, F. E. Brown and J. E. Hannon.

Stockton, Cal.—W. F. Pierce, president of the Blue Lakes Power Co., states that it is the intention of the company to increase the plant till all the mountain towns are furnished with power and light.

Cheney, Wash.—The Great Northern will probably substitute electricity for steam power in their shop at Hillyard.

Loomis, Wash.—The Palmer Mountain Tunnel Company will have a powerful electric plant completed and in operation by another summer.

San Bernardino, Cal.—E. D. Roberts has filed a claim for 500 inches of water for the purpose of generating electricity.

City of Mexico.—Dept. of Encouragement has granted Jose de Teresa Miranda 800 liters of water of the Magdalena River, for motive power purposes.

Fresno, Cal.—A project is on foot to use Tulare Lake in Kings Co., as a reservoir, and conduct the water to the lands to be irrigated by means of pumping, the power being electricity, which will be generated in the Sierra Nevada mountains. Promoter of enterprise is C. D. Davis, a civil engineer, who has good backing.

Hanford, Cal.—A. S. Smith has been here prospecting for a proposed line of electric power to go from Visalia to Hanford. He says he met with considerable encouragement. Mr. Smith is from Fresno.

Sonora, Cal.—Improved machinery is to be put in the Andy Johnson mine at Chinese Camp, electricity being used to compress air and run Burleigh drills. San Francisco capitalists will reopen this mine, which was formerly owned by the Morris Bros.

Willows, Cal.—Promoter, Aug. 7th.—R. A. Masson, an engineer in the employ of the Westinghouse Co., came up from San Francisco to-day and will make a study of Stony Creek for power purposes.

Placerville, Cal.—Notice is given that the Supervisors have received application for a franchise to construct, operate and maintain an electric power plant and system, with all necessary appliances, in Placerville, and bids will be received for said franchise up to 10 a. m,. Sept. 8th.

Sonora, Cal.—J. G. Hopper writes us that mining work is being rushed as never before in the vicinity of Sonora. Two additional cyanide plants will soon be in operation at the Black Oak mine and a 6 drill air compressor has just been put in.

The Seminole group of mines are to be operated on a large scale by New York parties for whom Col. J. L. Coles is resident manager. A new hoist has been put in on the Tanzy mine where the big strike was recently made, and a 5 stamp mill is going up at the Contenental. A steam hoist is to be erected at the Tarantula.

A new stamp mill is to be erected at the Providence under the management of Gus Ogden.

A steam hoist and pump has been put in at the Spring Gulch and a mill will soon go up. The eastern belt of Tuolumne county appears to be waking up as a mining district and promises in a short time to be producing many millions yearly.

Prescott, Ariz., Courier, July 22nd.

"J. D. Moore leaves for San Francisco to-night to make arrangements to introduce electric power in the mining regions of Alaska."

If that is Mr. Moore's purpose he would appear to have his work cut out for him.

Sonora, Cal.—The proposed transmission plant to be put in by Capt. W. A. Nevilles of the Rawhide mine is still delayed. Trouble has arisen over the matter of water power.

Riverside, Cal.—Earnest Hamilton will be the resident engineer in charge of theSan Gabriel Power Co.

Colton, Cal.—A. W. Norton, F. Dyer and Mr. Pickett of the Rialto Irrigation District, are having an estimate made of the cost of a new pumping plant, sinking 3 wells, running electric line to wells to furnish power, a telephone line connecting the plant with Rialto, and putting in a 40 h. p. electric motor for pumping.

City of Mexico.—Dept. of Encouragement has granted Lic. Sucisu Gomez Daza 4500 liters of the Cantarranas River, to be used for motive power purposes, either directly or by transformation into electric energy and transmission to a distance.

City of Mexico.—Luis F. Lajous has been granted a concession to divert liters of water per second from the San Diego River, also to excavate a canal from same river. If the system of electric transmission is adopted, he is empowered to erect poles for wires, or to lay conductor in subterranean conduits.

Jamestown, Cal.—Dr. D. S. Callahan of San Francisco and Dr. W. H. Garlich, president of a large Eastern Pottery Co. have bonded the Hidden Treasure mine and are negotiating with the Merced Mining Co. of Coulterville, to convey water from the old Tuolumne water ditch to the mine to furnish electric power to operate a 60-stamp mill which they intend to erect in the spring.

Riverside, Cal.—Several new applications for electric power have been received by the Board of Trustees. Harry Bantz, Mr. Miller of the planing mill, and Mr. Jackson of the bonemeal mill have applied. Mr. Bantz has a ten h. p. dynamo and will increase it to a 20 h. p. Mr. Miller intends to put in a 20 h. p. dynamo, and Mr. Jackson has applied for power to run a 30 h. p. The applications will be considered by the Light Co.—Etnerprise.

Butte, Mont.—Messrs. Fanning and Byllesby are promoters of an enterprise to generate the current about 2 miles from head of Big Hole river and to conduct it by wire to both Butte and Anaconda. Cost is estimated at $500,000 to $1,000,000. Besides the electrical machinery, the plant will contain steam apparatus for generating purposes in case of accident to water power.

Salt Lake, Utah.—A. G. Lamson, representing the Jordan River Electric Generating Co., has signed up contracts with the Boston and Mercur Gold Mining Co. to furnish electrical power for the operation of the La Cigale mill on the west dip, the minimum power to be supplied being sufficient to run a plant of 500 tons capacity. Another contract was signed whereby the company agrees to furnish S. B. Milner with electricity for the installation of an electric plant at Mercur, and it is understood that the company will furnish electrical power for the running of several other mills in Camp Floyd district. Bingham will be furnished with electricity and power also.

Salt Lake, Utah.—The reclamation of over 10,000 acres of land in the southern portion of Salt Lake county, is one of the benefits that promise to accrue from the establishment of the Jordan River Electric Generating Co.'s plant on the Jordan River, 8 miles north of Utah Lake. For the first few miles reservoirs will be constructed for the purpose of storing water and a pumping plant is to be installed.

Goldendale, Wash.—General Electric Light Co. of Portland have had survey of Klickitat Falls made for the purpose of furnishing electricity for The Dalles and Goldendale and to build an electric line from this place to Lyle.

The St. John Co. have bought the Gold Hill mines and the water right on Kelsey Creek, and will probably put in an electric power plant for the reduction of ore at their mines.

Redding, Cal.—The Garlick Electric Power plant near Copley will again be put in operation by the repairing of the Brumfield dam.

Nelson, B. C.—Sir Chas. Ross, one of the principal shareholders in the West Kootenay Power and Light Company, was in Nelson and says the company intends to erect a plant capable of supplying 10,000 h. p.—Tribune.

Rossland, B. C.—One of the railway corporations has made an offer to the owners of the town site and water power at Cascade City, to purchase the right to the water power there. Should the company secure the power it will establish car shops and terminal facilities at Cascade City, and develop the power so as to furnish power for lights and heat to the mining camps in that section.

San Bernardino, Cal.—Lytle Creek Reservoir and Power Co., to use waters of Lytle Creek by means of dams, ditches, etc., in the production of electricity for power purposes. Capital stock, $1,000,000. Directors: A. B. Hotchkiss, Los Angeles; C. B. Hughes, Lytle Creek; et al.

El Paso.—It is said that a syndicate of American capitalists, Rockefeller and Brice among them, contemplate the building of a half million dollar power house to furnish light and power within a radius of 60 miles of La Joya, near Chihuahua. The famous Santa Eulalia mines would be furnished with both.

RAILROADS.

Salinas, Cal.—Council—Bids for a 50-year franchise for a street railway were opened and an ordinance was passed granting franchise to the Salinas Ry. Co.

Los Angeles, Cal.—Commissioner Workman states that the Traction Ry. Co., will extend its line to Westlake Park.

Fresno, Cal.—Hundred Thousand Club—A committee was appointed on motion of E. F. Bernard, to investigate the feasibility of building an electric road to the high Seirras.

Los Angeles, Cal.—Engineers are out making an examination of a route for an electric railway line to San Pedro.

Provo, Utah.—Some of the business men of Provo are talking of an electric railway for Provo, upon the completion of the power plant in the canyon.

Oregon City.—It is probable that the Southern Pacific Co., will electricize their road from Oregon City to Portland.

Pasadena, Cal.—An ordinance amending ordinance No. 72, so that the Electric Railway Co., may erect poles and string wires on S. Los Robles avenue, and thus electrize their road was passed.

Berkeley, Cal.—An ordinance has been adopted by the Trustees granting to the Claremont, University and Ferries street Ry. Co., the right, franchise, and privilege of constructing and maintaining a railroad track on certain streets in Berkeley. M. L. Hanscom, Town Clerk.

Pasadena, Los Angeles, Cal.—The work of relaying a portion of the main track of the electric road commenced to-day. The re-record by the Pasadena and Pacific Electric Railway of mortgage for $350,000 does not effect the Pasadena and Los Angeles Electric Railway. The two companies are entirely different.

Los Angeles, Cal.—L. M. Lloyd, it is said, has sold the stock of the Ventura St. Railway to Messrs. Hall, Chrisman and Thorpe. It is said that the new owners will push the line out as far as Orten's Mills.

Redding, Cal.—S. H. Hendy of the Hendy Machine Works, San Francisco, and P. Treanton, went to Keswick and examined the proposed plan for the transportation of ore by cars operated by electricity.

Oakland, Cal.—A project is on foot to open up the country on the old Redwood road, with an electric railroad. It is stated that the plan will soon be carried out and that a connection will be made between the Laundry Farm road and the Highland Park road.

Redlands, Los Angeles, Cal.—H. H. Sinclair, of the S. Cal. Power Co., has closed a contract with the L. A. St. Co., to furnish them all the power for the running of their electric cars, etc., beginning Feb. 1st, 1898, when the electricity plan in Santa Ana canyon is expected to be finished.

Los Angeles, Cal.—Pres. C. W. Smith of the Pasadena and Pacific Electric Railway has agreed to extend that line from its present terminus to the foot of the trail up Wilson's peak. A plan is under way to construct an electric railway from a junction with the Pasadena road to the little Santa Anita Canyon, thence to the west fork of the San Gabriel valley to Bailey Flats, through mountains into Antelope valley country.

As soon as vice-President H. E. Huntington returns, work will be commenced reconstructing the cable and steam roads operated by the Market street system. The first improvement in contemplation is the reconstruction of the Howard street or Park and Ocean steam road. The dummy line on California street, north of the Park will also be transformed into an electric road. The western portion of the Sacramento street cable line, between Fillmore street and 6th avenue, and the Park, will be reconstructed and operated as an electric line in connection with the California street trolley road. The substitution of electricity for the cable roads on Post, Leavenworth, Tenth, Howard and 24th streets will be completed before the end of the year.

Los Angeles, Cal.—"Lucky" Baldwin is cutting a trail through the Sierra Madre Range, which is to connect the big Santa Anita canyon with the North Fork of the San Gabriel. Route has been surveyed and work has commenced. Information comes that the breaking of the trail is a forerunner to the construction of an electric road, which will open a new route to Antelope Valley and the region beyond.

Superintendent McLenegan of the San Mateo Electric Railway expects to begin the reconstruction of the main or Guerrero-street line at once. The company intends to rebuild the entire system. The first work to be undertaken will be on the route between the ferry and Thirtieth street. The order for iron and ties has already been given.

Superintendent McLenegan says that it is proposed to rebuild the Thirtieth or Cemetery line next. A double track will be laid from Thirtieth street to Holy Cross, a distance of seven miles.

The Park branch of the San Mateo line is also to be reconstructed and a single track laid on Seventeenth street, from Guerrero to Ashbury.

Oakland.—A transaction was completed the past month by which 15,000 shares of street railway stock changed hands and the Alameda and Oakland Electric Railway, the California Railway and the California Improvement Company passed into the possession of the realty syndicate formed by F. M. Smith.

The Realty Syndicate already controls the Oakland Consolidated, the Twelfth-street and Highland Park lines and is after the Eighth-street and East Oakland lines. The merging of these last interests now virtually places the street railway service of the city of Oakland in the hands of the men who are behind the syndicate.

The company will aim now to perfect its system so that the cost of operation will be materially reduced and the net profits much increased. The lines which have just been absorbed heretofore bore expenses aggregating $11,000 a month, with an income of $15,000. There will be a retrenching and going over of the entire holding, which will result in some radical changes and the introduction of some late improvements.

Oakland.—The California Safe Deposit and Trust Company foreclosed last month on the plant and line of the East Oakland Electric Railway Company on a judgment for $240,641 83.

The road was originally bonded for $250,000, and 128 of the bonds, each of $1,000 par value, were bought up by the clients of the Safe Deposit and Trust Company. Later on the street railway needed more money, and the remaining 122 bonds were pledged to the California Safe Deposit and Trust Company for a loan of $50,000. Later again F. M. Smith of the Realty Syndiate purchased the pledged bonds from the trust company, and still holds them. The company defaulted on the interest on the original bonds sold, and three years ago the California Safe Deposit & Trust Co., as trustee for the bondholders, commenced suit. J. C. Johnson was appointed receiver, and he has since conducted the line.

Damage suits, a falling off in business and the extraordinary expenses of the litigation in which the road has been involved place the balance on the wrong side of the account for the three years that Johnson conducted the road. He has issued receiver's certificates to the extent of $48,000, and that figure is taken as the difference between the receipts and expenditures for the period.

Johnson was continued as receiver until the end of the litigation. After the sale of the road takes place the stockholders will have the usual six months to redeem. E. P. Vandercook and C. E. White are the principal stock-holders.

LIGHTING

Hollister, Cal.—The Fort Wayne Co., has sold a lighting plant.

Hawaiian Islands.—The Hawaiian Electrical Co., has purchased from the General Electric Co., a 4 k. w. marine direct connected lighting plant.

Big Lake, Wash.—The General Electric Co., has sold a D. and T. H. 125 volt generator to Parker Bros.

San Francisco, Cal.—The General Electric Co., has sold the Sutter street Ry., Co., a 3 k. w. arc light plant.

Los Angeles, Cal.—The West Side Lighting Co., has ordered a 120 k. w. alternator from the General Electric Co.

Pasadena, Cal.—The Smith Electric Co., has purchased a 7½ h. p. Generator from the Westinghouse Co.

Klondyke.—The California Electric Works has sold a lighting plant to Mayor Wood of Seattle for use at Dawson City.

San Jose, Cal.—The Westinghouse Co., has sold a 120 k. w. lighting plant to the Electric Improvement Co.

San Bernardino, Cal.—Miller & Co., who have the contract for concrete work at the Arrowhead reservoir, have put in a 40-light plant.

Brigham, Utah.—Payson City has voted $5000 bonds to establish a municipal electric lighting system.

Sonora, Cal.—The application of E. D. N. Lehe to extend the electric light system was granted.

Wadsworth, Nev.—Henry Esden has commenced the preliminary work for the electric light plant for Wadsworth. A ditch will be constructed which will be a little over five miles long.

City of Mexico.—Gen. Jesus Arechiga, Governor of the State of Zacatecas, intends to improve the electric light system of that city. American concerns have bid.

Pullmand, Wash.—Council.—The electric light ordinance granting franchise for electric light plant to H. J. Jackson was ordered published.

Grant's Pass, Ore.—As soon as arrangements can be made, Electric Light and Water Co. will put in an up-to-date plant. They will put in such dynamos as will enable them to furnish power to run machinery.

Eugene, Ore.—The foundation is laid for the new power house of the Electric Light Company.

Lake View, Ore.—J. A. Anthony is preparing to establish an electric light plant to supply light for Lake View.

City of Mexico.—Harry Landsbert of the Toomer, Nunn., Electric Supply Co., is putting in a new electric light plant for the Interoceanic R. R. Co.

Kamloops, B. C.—The request of citizens of Vernon to introduce by-laws for the establishment of water works, electric light system, was granted. By-laws provide $12,000 for electric light; $53,000 for water works.

San Luis Obispo, Cal.—Board of City Trustees of Paso Robles will discuss with the citizens the advisability of bonding the city to put in an electric light and water plant.

Ashland, Ore.—Ashland Electric Light and Power Co. have had under consideration for some time the extension of its service, and in order to prepare for such a business, increased power will be necessary.

Medford, Ore.—R. A. Proudfoot, who purchased Medford electric plant, intends to extend the system to the residences of the city, so as to increase the plant to its working capacity. It has heretofore been running only about one-half of its capacity.

Vacaville, Cal.—Steps have been taken by stockholders of the Vacaville Water and Light Co. to pay off the present indebtedness and secure a portion of the funds to put in the new electric light plant and secure the needed additional water supply.

Ellensburg, Wash.—An ordinance has been passed that city shall acquire, construct and adopt a system of water supply for purpose of supplying electric light plant with power and to furnish power for other purposes. That there shall be necessary headgates and approaches constructed; also a power house. Cost is estimated at $10,000. P. P. Gray, Mayor.

Perris, Cal.—A meeting of residents was held recently at the office of G. A. Doyle for purpose of listening to a proposition from Prof. Baldwin, with a view of using electricity as a power for pumping water, lighting, etc. If sufficient guarantee be given, Prof. Baldwin will build the line from Mill Creek, and also furnish dynamos and pumping plants.

Sacramento, Cal.—On motion of Devine, the corporation counsel was instructed to draw up an ordinance for submitting to the people the proposition of constructing a municipal lighting plant.

Dixon, Cal.—Trustees—The committee appointed to visit Sacramento to get an estimate from the electric light companies of that place for supplying Dixon with light, reported that it would cost $25,000 to install the innovation, and the matter was dropped without consideration.

Mercur.—F. R. Leonard is in town in the interest of the Jordan River Electric Co. The Co., will apply for a franchise for lighting the city, and propose to be ready for business within 60 days. The Co., is also negotiating with the Mercur, Geyser-Marion, Sacramento and La Cigale to furnish power for operating the machinery. The Telluride Co., has also applied for a franchise.

Chico, Cal.—Sealed bids will be received up to 8 p. m., Sept. 6th, for a franchise to maintain and operate an electric light and power plant in Chico, application for said franchise having been made by J. W. Hartzell. C. H. Woods, City Clerk.

Santa Rosa, Cal.—At a meeting of the Trustees of the Home for the Care and Training of Feeble-Minded Children at Eldredge, the General Electric Co., of San Francisco was awarded the contract for wiring the buildings, furnishing fixtures, dynamos, and in fact the entire electric lighting plant. The price is about $8,000. The prices of the different companies for furuishing the 30 k. w. dynamos with marble switch board, etc., set up complete were as follows: General Electric Co., $1,135; Westinghouse, $1,289; Siemens & Halske, $1,477; California Electrical Works $1,530; Fort Wayne, $1,688.

San Jacinto, Cal.—City Trustees—Chas. Chambers petitioned for a franchise for an electric light system and a motion was made and carried to advertise for bids for same.

Chico, Cal.—Trustees.—The lighting franchise of J. W. Hartzell to construct, etc., an incandescent light and power plant here was not granted. Trustees were willing to grant it, if the franchise is advertised and bids called for. A motion was made and carried to advertise the application and invite bids.

Myrtle Point, Ore.—F. M. Friedberg, manager of Marshfield, Ore., Electric Light and Power Station, has been granted a 30 years' franchise and entered into a 10 years' contract with him to furnish water to the city. He has purchased the mountain spring on the ranch of Curt. Andrews, and three acres of land, and will construct reservoirs, dams, etc.

Dixon, Cal.—Trustees.—A meeting of citizens and taxpayers was held to discuss the question of light and water for another year. The Trustees have been unable to arrange with the Dixon Light and Water Co.

Grant's Pass, Ore.—The plant of the Grant's Pass new Water, Light and Power Co. was totally destroyed by fire to-day. The loss to building, and damage to machinery about $15,000. No insurance. The company intends to rebuild the plant at once.

Hanford, Cal.—H. G. Lacey & Co. have made application to the Supervisors for a charter to erect electric light poles along all the public roads of Kings county. The works will be located in their brick warehouse west of the flouring mill.

Vacaville, Cal.—Stockholders of Vacaville Water and Light Co.—Steps have been taken to pay off the present indebtedness of about $6500 and secure a portion of the funds to put in a new electric plant and secure the needed additional water supply. An auxiliary pumping plant can be put in if necessary, which will pump into either the mains or the reservoir and supply all water needed for towns twice as large as Vacaville is at present.

Ft. Bragg, Cal.—The committee appointed to report on the feasibility and cost of water works, sewer system, electric lights and City Hall, for Ft. Bragg, submitted their report. Detailed reports were submitted, but the following figures are for total costs of each: Water works, $9,835.49; other things connecting with the water system, $2944. Electric lights—No report was made, but they said that the additional cost would be cost of dynamo and connections to steam power for pumping works.

Marysville, Cal.—Several petitions have been presented to the City Trustees during the past few years asking for electric light franchises. Col. J. W. Hartzell asked for one last night to conduct an incandescent electric and power plant, and it is the intention to ask for a contract to light the city. He and those interested with him are willing to put in a $300,000 plant. The ordinance was introduced and referred to the Ordinance Committee.

Albuquerque, N. M.—The Silver City Electric Co. is to supply electricity for light, heat and motive power to Silver City. Capital, $19,000. Directors: M. W. Neff, W. A. Hawkins, G. D. Jones, et al.

Las Vegas, N. M.—Silver City.—The Electric Company has filed articles of incorporation. M. W. Neff, president; G. D. Jones, secretary. Some of the machinery is already on the grounds.

San Francisco, Cal.—Articles of incorporation of the Brooks-Follis Electric corporation have been filed by James H. Follis, Harrison Brooks, John W. Brooks, Richard N. Follis and E. A. McInerney.

Grand Forks, B. C.—Dr. Lefevre of Vancouver is arranging for construction of a telephone line between Grand Forks and Marcus, Wash.

San Andreas, Cal.—The Sierra Telegraph Co., to build a telegraph line from Oakdale to Sonora, Angels, Coulterville, Modesto and La Grange, with branch lines to several of the mines of the Mother Lode.

Pasadena, Cal.—The Smyth Electrical Co., to manufacture electrical ore-crushing machinery. Capital, $300,000. Directors: C. F. Kernaghan, R. Easln, J. F. Smyth, H. M. Dobbins, et al.

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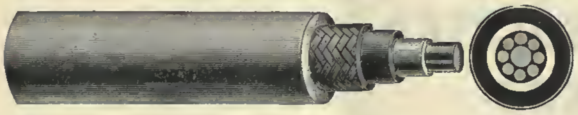

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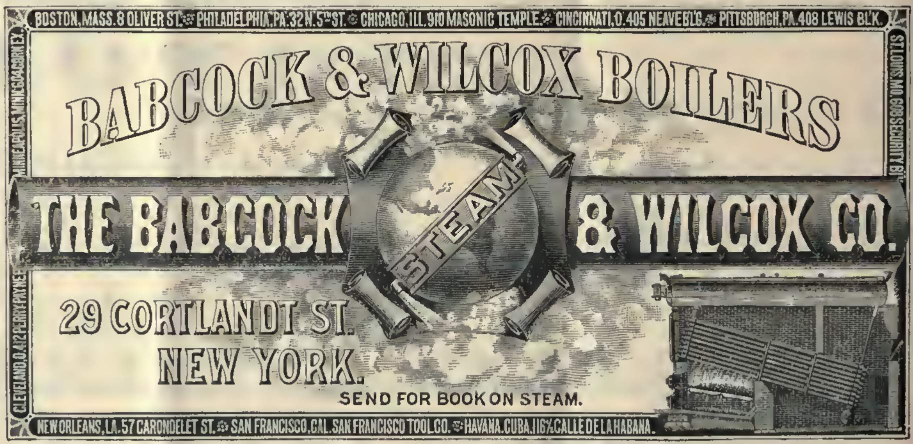

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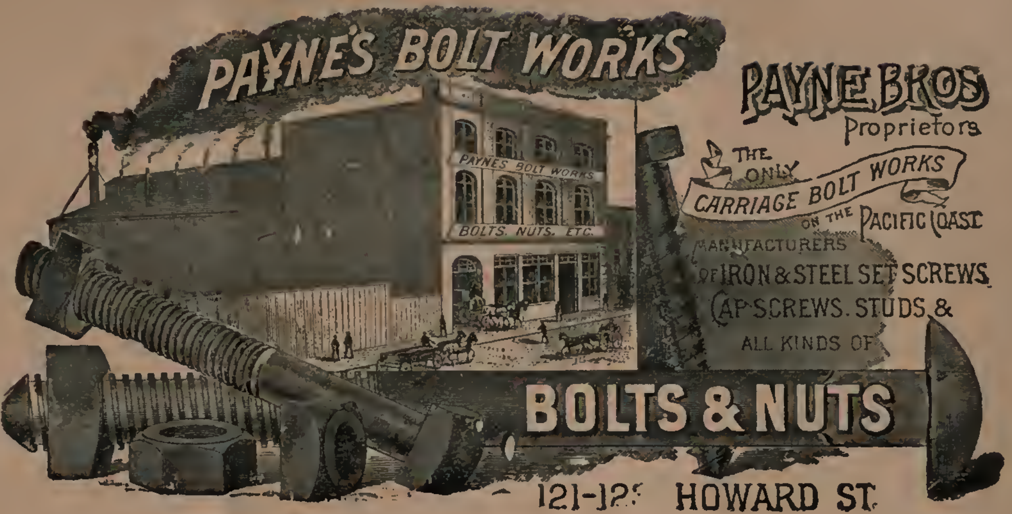

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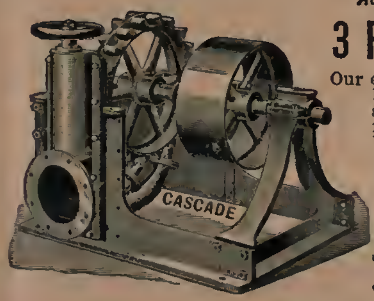

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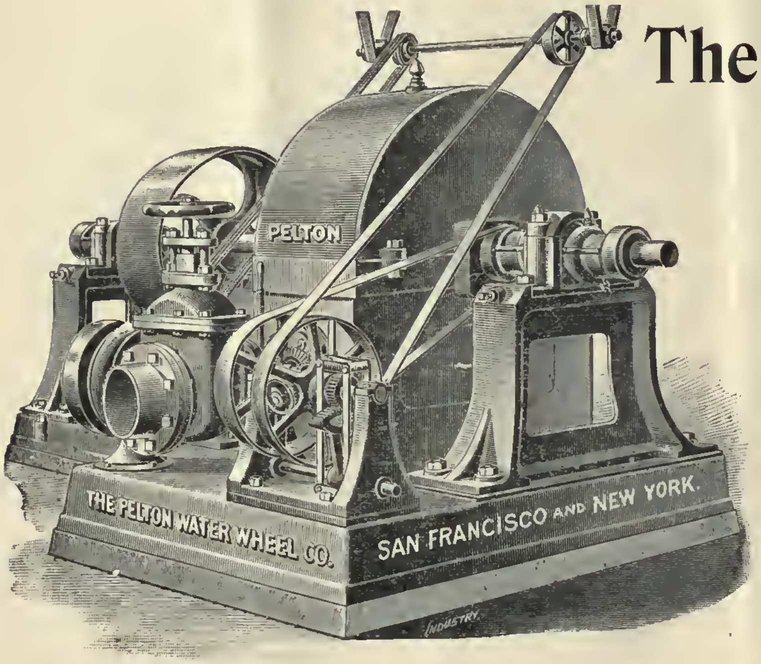
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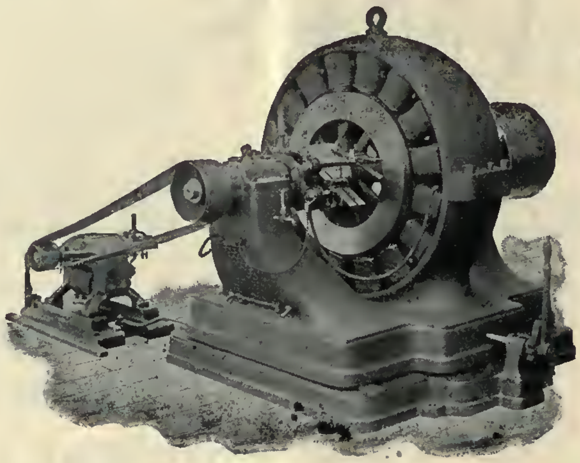

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THE DUNCAN ENCLOSED ARC LAMPS.

There has recently been developed and is now being manufactured in this city an enclosed arc lamp of about 750 candle power, that, from the simplicity of its construction and the marked economy of its operation promises to become an important factor in the electric lighting field.

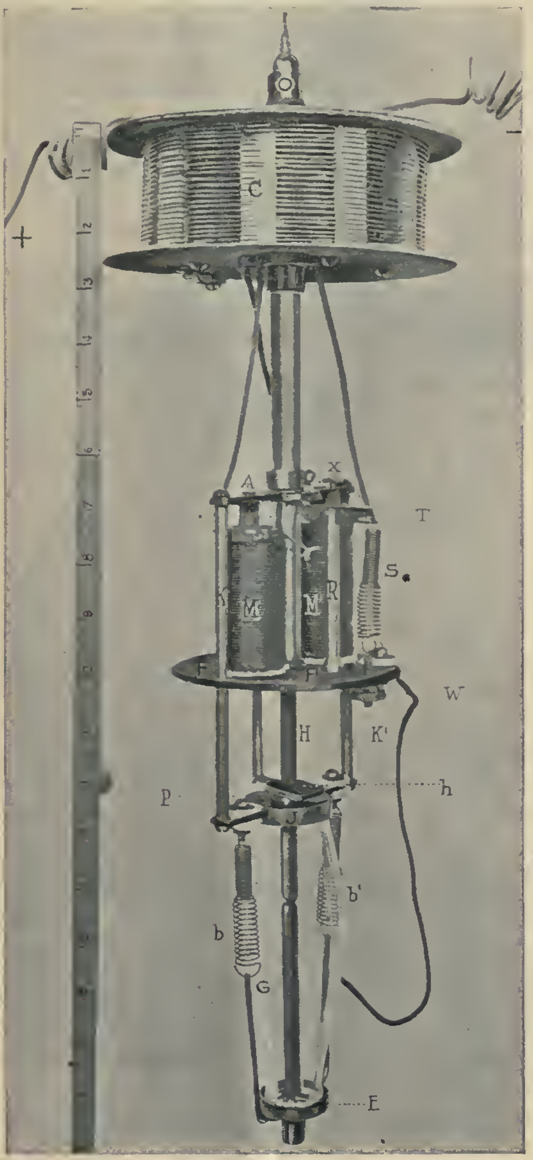

FIG. 1.

The construction of the lamp is shown in figure 1 and its mechanism is so simple that its operation can be readily understood.

The inner globe "G" of special clear glass completely surrounds the arc, being capped at both ends. The U frame "E" is the lower carbon holder and also lower receptacle for the globe. The springs "B"-"B" prime rigidly support the globe against the metal piece "J," through which passes the upper carbon. Complete combustion of the carbon is obtained by the admission of a proper amount of oxygen around the upper carbon. When the gasses abnormally accumulate they are permitted to escape through the gas check "P." This inner globe also acts as a perfect spark arrester, and as such this type of lamp has been endorsed by all Boards of Fire Underwriters. This inner globe also renders the burning of the lamp noiseless.

It will be seen that no carbon rod is employed, the carbons sliding in a dome or upright tube contact. The carbon is held by a simple brass holder. The arc is sprung by the lower carbon and the feed supplied by the upper carbon "H." While the clutch "h" is very sensitive in its operation, acting directly on the carbon, its principle is so simple that there is no liability of sticking of the carbon. The lamp is so designed that the upper carbon burns to a length just suitable to be used on the next trimming for the lower carbon; thus there is no waste. When this point is reached the current absolutly cuts off.

The lamps before leaving the factory are adjusted to be used on a 110 volt D. C. circuit; that is, the potential at the lamp terminal is 110 volts. In the upper canopy is a German silver resistance coil "C." On the opposite side, not shown in cut, is a sliding contact. When this contact clip is in the middle the lamp is adjusted forp 110 volts, when at the top the lamp is adjusted for 100 volts, and when at the bottom 120 volts.

To secure the longest life of carbon, the steadiest and brightest light possible, an imported carbon, specially manufactured for this lamp is used. The upper carbon is 12" long by 5-16" in diameter. The lower is 5¼" long by the same diameter. At from 2 to 2½ amperes current the lamp will burn on one trimming 100 hours using 5-16" diameter carbons. It is well known that in lamps of the enclosed arc type the carbons do not burn to a point and crater as in the open arc, the arc streams around the periphery of the carbons burning them off flatly; thus the side of the carbons furthest from the arc stream tends to cast a slight shadow.

Most lamps on the market use a ½" carbon. While some few employ a 7-16". In the Duncan Arc lamp of this size, using a 5-16" carbon, the rotating path of the arc stream being much shorter, this shadow is greatly reduced.

The total length of the lamp is slightly over 20". Its weight complete is 7 lbs. The canopy is made of perforated metal, as shown in the cut; thus securing thorough ventilation. The greatest care has been taken in the manufacture of the lamp. All parts are neatly finished and nothing but the best fire proof insulating metal is employed.

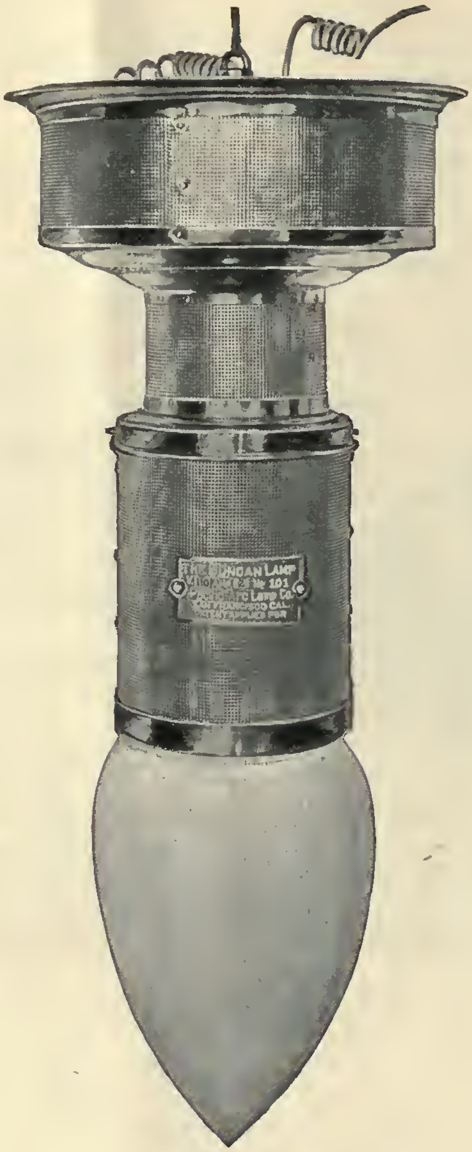

FIG. 2.

Figure 2 shows the lamp complete with canopy and outer globe, which screws into the canopy.

No middle support is needed at the bottom of this outer globe, and hence, all possible light is obtained directly underneath and shadows from this source are reduced.

Figure No. 3 represents the lamp without an outer globe, but provided with a white enamel metal reflector for window lighting.

For inside use the lamps are furnished in polished brass or antique copper; for outside use they are weatherproof and finished in black. The weatherproof lamp is slightly longer than the inside lamp. Inside lamps are furnished for suspension by a ring. If it is desired to hang the lamp from a gas pipe drop, this ring may be unscrewed exposing the 3-8 standard gas pipe thread.

The feature of this lamp is its great simplicity and fewness of feeding parts, by which the liability to accident and cost of repairs are reduced to a minimum. These facts strongly appeal to the consumer. The lamp as ordinarily used will consume from 2 to 2½ amperes on a 110-volt circuit, equal to 250 watts for 750 c. p. An incandescent lamp of 16 c. p. consumes 57.6 watts per hour; thus the consumption of current by the Duncan arc lamp is a little less than that required by five 16 c. p. incandescent lamps and the c. p. is over nine times as much; that is, five 16 c. p. incandescent lamps gave a total light of 80 candles consuming 288 watts. One Duncan arc lamp, 750 c. p. current consumption 250.

Figure 4 shows a curve drawn from readings taken two minutes apart for 30 minutes and gives a good idea of the steadiness of burning of the lamp.

The difference of potential at the arc of this lamp, whose current density is but two amperes, is 75 volts, which is very remarkable when we consider that the potential of the arc of 5 ampere lamps runs about 65 volts.

All station managers know how within the last two years the enclosed arc lamps have grown in favor with the publi Their success which has been phenominal, has been due to their direct commercial advantages over the open arc.

L. B. Marks in his exhaustive paper, read before the Societe Internationale des Electricians, at Paris a few months ago, summed these advantages up as follows:

1. Cost of carbons about one twentieth that of the open lamp.
2. Cost of attendance about one tenth of that of the open lamp
3. The annoyance of daily trimming no longer an objection to the arc lamp.
4. Absence of shadows of the carbon points; uniform distribution of light.
5. One or more lamps on small amperage, operated independently.
6. Cleanly; carbon dust entirely consumed.
7. Formation and escape of sparks prevented.
8. No flush of current at start of feed.
9. Simple lamp mechanism.

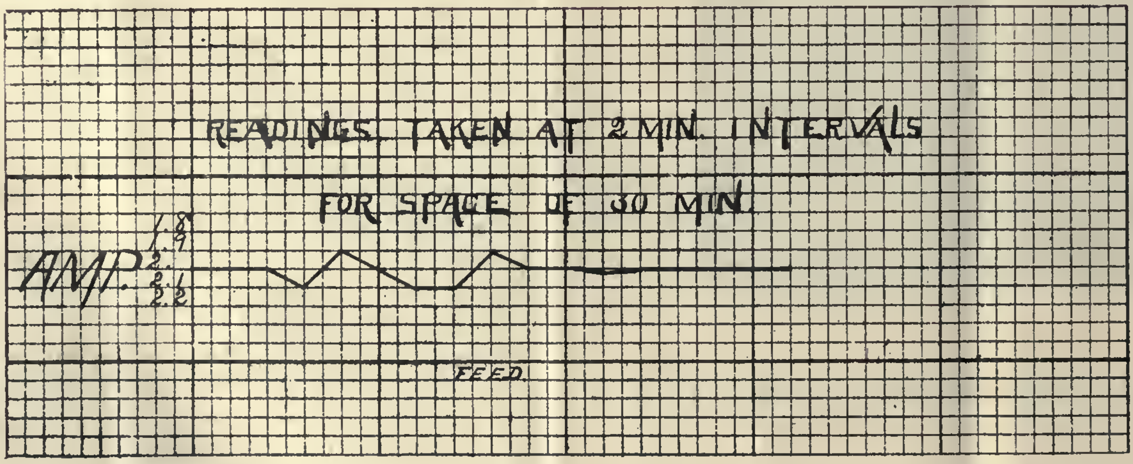

FIG. 4.

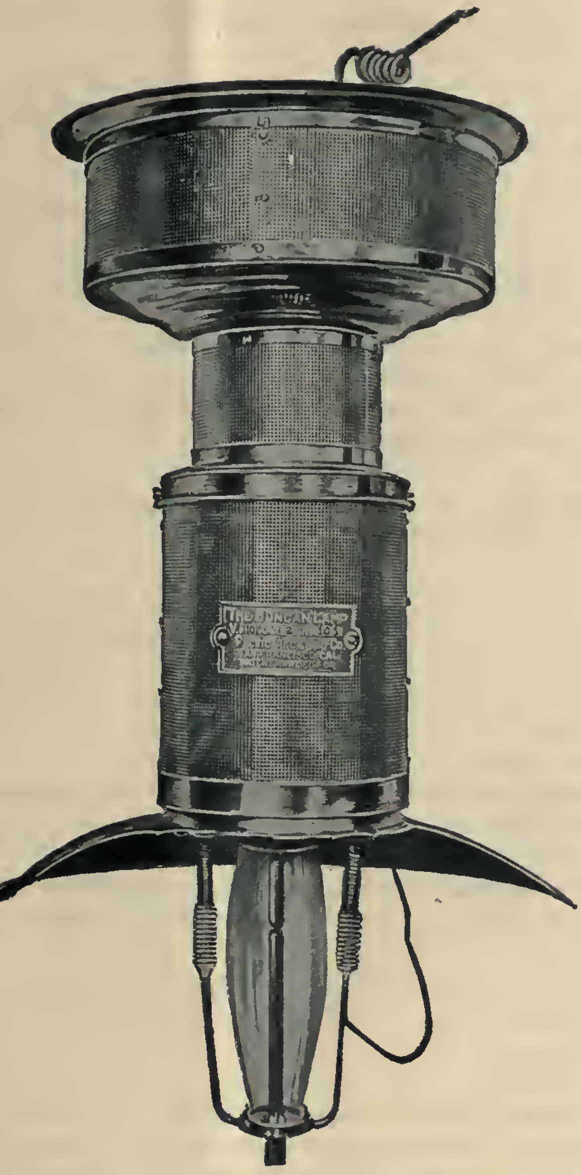

FIG. 3

The Duncan arc lamp, from its low first cost, its great economy of operation and its peculiar adaptability for use where the 2000 candle power enclosed lamps furnish more light than is needed, while incandescent lamps are too expensive and not effective enough, promises to meet a want that is very great and one that station managers have not as yet been able to meet satisfactorily.

The Duncan lamp is manufactured in San Francisco by the Pacific Arc Lamp Co., at 23 Stevenson street.

Agents have been established in New York and Chicago, and a large number of orders for lamps have already been taken and are now being filled.

The first meeting of the Pacific Coast Electric Transmission Association was held in Santa Cruz, Cal., on August 17th and 18th, there being present Messrs. C. P. Gilbert of Sacramento, Robert McF. Doble of San Francisco, F. W. Swanton of Santa Cruz, A. C. Balch of Los Angeles, C. N. Beal of Bakersfield, E. W. Sutcliffe of Sacramento and J. S. Eastwood of Fresno. Those present by invitation were, Messrs. J. A. Lighthipe, R. S. Masson, F. M. Pickering and A. M. Hunt of San Francisco, W. G. Barrett of Los Angeles, C. W. Quilty and H. J. Edwards of San Jose, C. E. Lilly and H. Willey of Santa Cruz, F. J. Cramm of Chicago.

The subject for consideration of the meeting was high potential insulators, concerning which papers were read as follows:

"Insulators," by Dr. C. Van Norden, outlining experiences on the 15,000 volt transmission lines of the Central California Electric Company.

"Line Construction," by J. S. Eastwood of the Fresno transmission, being an exhaustive discussion of the essential features of pole lines.

"Insulators for Use on Transmission of Power Lines Operated at High Voltage," by Henry D. Sears, describing desirable qualifications and the process of manufacture of high tension insulators.

"Insulators for use in the Transmission of Electric Power," by T. A. W. Shock, being an account of interesting experiences with insulators on the Folsom-Sacramento transmission line.

The next meeting of the Association will be at Sacramento, October 20th. Lightning protection and the insulator question will be considered.

The membership of the Association will be increased to allow those outside of the transmission companies to become associate members.

San Diego, Cal.—The telephone and electric light committee has before it the ordinances proposed by Alderman Nutt, directing the City Clerk to advertise for bids for furnishing the city with street lights for a year beginning April 1st, 1898, and also directing him to advertise for propositions for building city electric lighting plant.

The Wybro & Lawrence Co. of San Francisco and Los Angeles, have opened an office at No. 53 Chronicle Building, this City, with Mr. H. C. Wybro in charge, who is an old timer in this line of business, having been engaged in building and operating Electric Light and Street Railway Plants since 1886. They intend to actively engage in the Electrical and Steam Machinery business. At the present time this company have the contract for the installation of the electrical plant in the Examiner Building in this city, and the work is being done under the immediate supervision of Mr. Wybro, who also acts as consulting engineer, representing Mr. E. R. Knowles, of New York, the gentleman who made the plans and specifications and who in addition to being consulting engineer for the Hearst estate, occupies a similar position with the New York and Brooklyn Bridge Company, the Mergenthaler Linotype Company, and the New York Journal.

The Examiner building will make extensive use of electricity in all their departments. The power plant in the basement will consist of Water Tube Boilers, Payne engines and Card Dynamos, directly connected to the engines. There will be in the neighborhood of 250 horse-power in motors operating printing presses, Linotype Machines, Electric Elevators, etc. The generators and motors are being made by the Bullock Electric & Manufacturing Co., of Cincinnati, Ohio.

The wiring of the building will be done by using the new Iron Armored Conduit System of the Interior, Conduit and Insulation Company of New York, complete in all details.

The electric current for all of the motors, arc and incandesent lamps, will be of 220 volts potential. This is a radical departure from the old custom and is a step forward in the right direction. From present indications it will be but a question of time until 220 or even 250 volts will be the recognized standard for incandescent lights.

There will be a complete inter-communicating telephone system connecting the heads of the departments of the vast newspaper plant.

THE PACIFIC ELECTRICIAN.

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Vol. XVIII. SEPTEMBER, 1897. No. 9

DUNCAN ENCLOSED 750 CANDLE POWER ARC LAMP.

Within the past two years, since the introduction of successful commercial enclosed arc lamps their use in the United States has grown in a manner that has been phenominal. Their extreme simplicity and great economy of operation has been the main factor in their success. At first only lamps of high candle power were used, but it soon became evident that there was a wide field for enclosed arcs of from 500 to 1000 candle power and recently such lamps have been put upon the market. The Duncan lamp, which is described on another page,is an enclosed arc lamp of about 750 candle power and stands to-day as the most advanced and best constructed lamp of this type on the market. Station managers will readily recognize that if the claims made for it are correct, it will at once take an important place in electric lighting.

As a Pacific Coast product, invented, developed and manufactured in San Francisco, we feel an especial interest in its success.

The Fort Wayne Company has secured the right from European parties to control their American patents for electric power transmission apparatus and will soon be in the market as a competitor with the Westinghouse Stanley and General Electric Companies.

Mr. Lloyd says that he will be ready to make contracts on the most favorable terms.

Money is no object to him and he will take in payment bonds, notes or any old thing that looks promising.

He ought to be able to do a large business on this basis, for generally the men who control good power propositions do not have the facilities for raising the necessary funds as they are not in touch with the money market. One of the best paying power plants in operation in the State, that of the Nevada County Power Co., was a purely bond proposition that went begging for some time until Mr. Martin of the Stanley Company, had the good judgment to take it up and make it a success.

Mr. Lloyd is certain to have a good many wild schemes proposed to him and his success or failure will depend on his judgment in placing his money.

The contract for the electrical equipment of the San Gabriel Power Co. is to be let shortly. This company will transmit 1000 horse power to Los Angeles and proposes to put in its own distributing system in Los Angeles, where it will compete with the established companies for lighting and power. Messrs. Hasson & Hunt are the consulting engineers for the San Gabriel Company and have prepared the plans and specifications.

The Monterey power transmission scheme again shows signs of life.

The reorganization of the Sacramento Electric Light and Water Company— the Folsom power plant—in the interest of the bondholders, has been in hand for some weeks past and is now about completed. Mr. Drexler will be the President and the finances of the company will be placed in a sound condition.

The trouble seems to have been that the company has spent nearly two millions in its operations. This money was raised by the sale of bonds, but the market was slow, so that some of the bonds had to be placed at a sacrifice. It was found impossible to place enough bonds to meet the needs of the company for money and there has been considerable trouble. The earning capacity of the plant, however, is good and it is likely under different management to prove a valuable property.

In our editorial on the the Southern California Power of last month, we should have stated that the General Electric Company's contract covered the step up transformers, lightning arresters at the generating station and all the station equipment at the generating end of the line. Since our last issue General Electric Company has received contract for the sub-station plant to operate the electric railroad in Los Angeles, for which the Southern California Power Company has recently closed a contract.

This will include over 1500 k. w. of generators and motors with switchboards, etc. A fourth 750 k. w. generator at the generating station which was conditional on the Southern California Power closing with the railroad also goes with this.

Mr. Martin of the Stanley Company has returned from the East, where he went to make financial arrangements for putting in an electric power transmission plant near Marysville.

"Jerry" Dunn, the well known contractor for electric wiring, has gone to the Home for the Feeble Minded in Sonoma county. The inmates greeted him warmly and one of them called him a "lost sheep" that had returned to the fold.

He is not likely, however to prolong his stay after he has completed his wiring contract.

STATIC SPARKS.

Wm. Forbush of the Chicago, Milwaukee and St. Paul Railway Company has recently written a letter to a prominent business man in Seattle, in which he outlines the latest scheme proposed in the effete East for opening up the Klondyke country. Mr. Forbush says:

"The Pullman Palace Car Company has completed models of a sled that is to make travel to Dawson practical in the middle of an Arctic winter. The company backing the proposition is the Great Northern Mining and Transportation Company, which will shortly open offices in the Great Northern Hotel Annex in Chicago. The sleighs will be built by the Palace Car Company, furnished with upholstered berths and heated and lighted with electricity. They will have a speed of from ten to twenty miles an hour, according to the condition of the river. On the first trip it is proposed to take a number of men who will smooth over the rough places, and after the pilot becomes acquainted with the road fast trips will be possible. Passengers, baggage and freight will be carried at reasonable rates. All the plans of the company are patented.

"The transportation scheme is not the only one patented by the company. They will build smaller sleighs which will be disposed of to individual prospectors. They will also be propelled by motor, and with them it is said a prospector can go anywhere he may desire on ice. The sleds will be fitted with diamond drills which can be driven by a motor through ice, and in this way bars and placer ground now only accessible in the summer and at low water can be prospected in widwinter. If the diamon drill indicates gold in quantities the prospector can stake off his claim."

Mr. Forbush states in the letter that there is nothing about the scheme that has not been tried, and that they know it will work successfully. The company expects to put the sleighs in operation during the coming winter.

The scheme is a brilliant one and does credit to the imagination of Mr. Forbush and the credulity of the daily journalism, but there is one point that was not touched on that is of considerable importance. That is the source from which power is to be derived to operate the electric motors.

At first glance it would appear to be somewhat difficult to run a trolley line up the Yukon, to say nothing of the individual lines that would be needed by each prospector. The explanation is, however, very simple, and the reason it was withheld was that the patents had not been granted at the date Mr. Forbush wrote.

The scheme is to secure power from the Aurora Borealis by induction. The details have been fully worked out in Chicago and the promoters are now awaiting for cold weather to set in.

N. B.—Now that the scheme has been given publicity, we understand that the Electrical Review will shortly publish a communication from Tesla, in which the great inventor will explain that he has been working on the same lines for many months and is at last on the point of achieving complete commercial success. The fact that he filed a caveat on the Aurora Borealis in his early childhood will be pointed to by the Electrical Review as an evidence of the priority of his claims over those of Mr. Forbush.

We understand that Mr. Edison is also experimenting in the same line and will presently tell the reporters of the daily press all about it.

The matter of government by injunction is getting to be a pretty serious affair and there is no telling when it will stop.

It is all very well for the courts to order a minister to stop preaching and to keep labor leaders off the public highways, but now that the judges are taking a hand in the electrical business we must enter a protest.

The affair to which we refer took place at Milpitas last week and came near leading to a serious riot. It seeems that the owner of the Milpitas Chicory and Sinker Cafe desired to purchase an electric motor to be used for heating and cooking purposes. Plans and specifications were sent out and the contract was to be let on the 13th.

On the 10th Mr. Briggs of the Fort Wayne Co. went before Judge Dictum of the Federal Court for the Northern District of Haywards, and alleged that certain parties were preparing to interfere with him in the carrying out of his legitimate business, which was to secure the contract for a heating motor in Milpitas.

On this showing, the Judge, following the Pennsylvania cases, granted an injunction prohibiting Mr. Heger of the Westinghouse Co., Mr. Ridley of the Siemens & Halske, Dr. Addison of the General Electric, and John Doe and Richard Roe, representing the companies mentioned, or any others that might be in the field, from approaching Milpitas or conversing with any of its inhabitants—they were allowed to breathe, but not in that direction.

All travel between Milpitas and the outside world was at once cut off, and if the restaurant man had not at once let the contract to Mr. Briggs, it would have been necessary to call out the Federal troops to preserve order and guard the decree of the Court from contempt. The injunction still remains in force, however, and Dr. Addison is not permitted to ride his bicycle within five miles of Milpitas.

Mr. H. C. Wybro has been appointed supervising engineer for the electrical work on the Examiner building that is being erected on Market and Third streets. He represents Mr. E. R. Knowles of New York, who prepared the plans and specifications for the work. Mr. Wybro is also manager of the Wybro & Lawrence Company, that has the contract for wiring the Examiner building.

Under the circumstances, there is not likely to be any trouble between the contractor and the engineeer. The work will all be promptly approved and if any conditions arise not provided for in the specifications, the contractor and engineer can readily consult together and reach an amicable understanding, for as the Lord High Executioner says in the Mikado, "A man can't execute himself, Recorder." Joking aside, the appointment of Mr. Wybro as engineer is certainly a high compliment to him, for it shows the confidence that Mr. Knowles has in his integrity.

AUTOMATIC DEVICE FOR STORAGE BATTERIES

It frequently becomes desirable to operate storage batteries and generators in multiple, on the same circuits so that the battery may automatically receive or deliver charge as the load in the circuit changes.

Such a case presented itself when the isolated plant was installed in the Safe Deposit Building in this city.

In this instance, the load consisted of the lights in the building and two Sprague-Pratt screw elevators. The application of load due to the elevators was so severe as to cause extreme variations of voltage at the lamps.

To overcome this, the arrangement represented in the sketch was devised and installed by Messrs. Meredith & Hunt. Its action was very beneficial, and in spite of the severe variations of elevator load, there was practically no blinkng of the lights.

Referring to the sketch, 1 is a dynamo whose external circuit is 19-21-20; 7 is the armature of a booster, having independent field windings, 12 and 18, which are magnetically opposed; 5 is an electrical storage battery.

The storage battery and armature 7 are in series, and the two are in shunt across the terminals of dynamo 1.

The field winding 18 is in series with the external circuit of dynamo 1, and 16 is a rheostat, by means of which the amount of current flowing through 18 may be regulated at will.

Thirteen indicates a rheostat by means of which the resistance of this shunt may be varied at will.

The potential difference between the brushes 8 an 9 will vary inversely as the load in the external circuit 19, 21, 20.

When the electro motive force of 7 is reduced below a certain point by increase of load in the external circuit 19, 21, 20, the battery 5 will deliver charge to the external circuit. As the load in the external circuit becomes light, the E. M. F. of 7 rises, and the battery receives charge. In this manner the load on may be kept approximately constant, although the demand in the external circuit fluctuates.

This combination is especially adapted for use in places where the fluctuations of external load are rapid and frequent, as in street railways, and most other power stations.

NOTES ON LINE CONSTRUCTION.

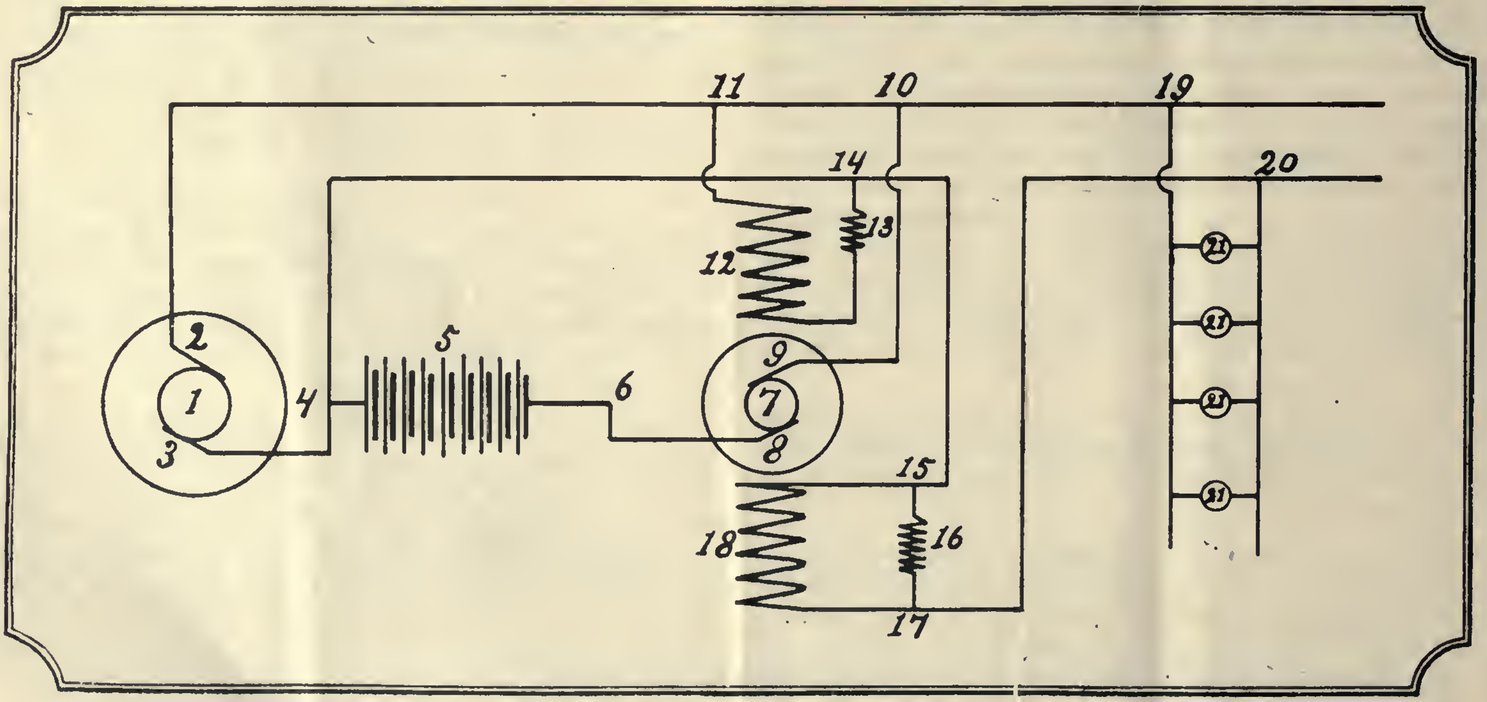
[Paper read before the Pacific Coast Electric Transmission Association at Santa Cruz by J. S Eastwood of Fresno.[

In presenting the following elementary notes, I beg the indulgence of the members of this association, for, while there may be nothing new in this paper to you that have built your lines and whose experience may in all directions exceed that of the writer, if in any way I shall have added to the practical literature on the subject and shall have given information to those contemplating new works, I shall feeel myself amply repaid.

When the plans for a transmission plant are under consideration it may be taken as a rule that the plans and specifications of the pole line will receive less consideration than any other part of the plant. This is due largely to the fact that the hydraulic and electrical equipment is accompanied by plans and specificaions of the manufacturing company's engineers, the apparatus being guaranteed as to workmanship and efficiency, while the pole line material beng usually furnished by a number of different parties, is thrown together haphazard under the directon of a lineman and a carpenter. This laxness is largely due to the fact that the literature bearing on Line Construction practice is extremely meagre.

The modern electric transmission line is an evolution of the telegraph line and the later telephone and electric lighting distribution lines and the tendency has been to follow the loose methods and bad workmanship of the earlier constructions.

Like any other part of an electrical transmission plant the pole line should be designed to fit the local conditions, but there are some general points that should be carried out in all lines. In all of the earlier discussions of the problem of power transmission the great question of doubt was in the maintenance of uninterrupted service on the line. The general concensus of opinion was that the dangers of interruption would be in direct proportion of the length of the line In practice this fact in transmission work will depend to a very large degree on the character of the line construction. The plans and specifications for an electrical transmission



Automatic Device for Storage Batteries.

line should be based on the same sound engineering principles as those of any other permanent work, and the line should be so planned as to cost the least for maintenance coupled with economic cost of construction. Good engineering consists of good judgment coupled with technical knowledge and good engineering work consists of construction wherein all the factors bearing on the case are given their proper value in the resulting equasion and the results are a work costing the least money for construction consistent with the most economical maintenance.

The general features entering into the problem of line engineering are line location, line material and line construction. In taking up and weighing these factors they should be considered in their relation to the prime idea of electrical transmission, namely, permanent continuity of service.

We will consider first the factor of line location. One of the most important features of line location is that of alignment. A general rule that it is wise to follow when at all possible is one laid down by the Czar of Russia, who, when asked to locate the line for a railway from St. Petersburg to Moscow did so by drawing a straight line between the points with a ruler.

The factors that enter into the problem of location to prevent a straight alignment are such impassable barriers as very wide streams, lakes, inaccessible canyons and mountains and in many cases the difficulty and expense of obtaining rights of way. In computing the relative value of these factors they must be weighed by consideration of the additional drop in the line by reason of length added, the additional cost of angles and the added line and the cost of right of way. Another feature of much importance brought out by the experience with the San Joaquin Electric Co.'s lines is that the danger of malicious interruption is very largely decreased by having the lines remote from public highways. Our line has its general direction of South thirty degrees West, and we found that we could much better pay $250.00 per mile for right of way than to take free right of way on Section lines around the lands in question, even when counting in only the initial cost of the line and leaving out the features of added drop, angles and maintenance.

In the location of the line over rolling and hilly ground, there is very little to be gained by one location over another and as a rule it is better to keep as straight as possible regardless of the character of the ground. On very rough ground there is a slightly increased cost to be added for the delivery of line material in difficult places but this cost will be more than offset by the shortening of the line. Measurements for line work should be taken on the slope of the ground as that represents the true distance. In running over undulating ground it will be found that the upward pull will occur on very few of the poles as the hill slopes are almost all vertical curves giving a downward pull, the upward pull occuring on one or two poles at the ravine crossings. All sharp horizontal angles should be avoided in transmission line location. If necessary to turn the corner at right angles the angle should be broken in two or three parts and the poles set close together to take up the additional strain.

We will next take up the question of line material. The selection of line material is one of vital importance in line construction as upon it more than on any other feature depends the life of the line and consequently the cost of maintenance. A good rule to follow in this regard is that the best material obtainable is none too good. The vital element in so far as the life of the line lies is in the selection of the poles. We of the Pacific Coast are exceedingly fortunate in having an abundance of excellent material for poles and a variety from which to choose. In making the selection for the San Joaquin Electric Co.'s poles the central idea was that of making the most permanent line. After many years of close observation the conclusion has been reached that the sapwood of any variety of timber is absolutely worthless as to its lasting qualities in the ground and that it is a menace to any transmission line in that it is lable to be counted on for strength that in a few years disappears, and besides the decaying portion leaves a pole loose in the ground, subjecting it to greater strains and also leads to decay of the more resistent heart wood. Having seen round cedar telegraph poles along the line of the Southern Pacific Railway that had been in the ground but twelve years and that had rotted entirely off in that time and also having seen sawn redwood poles that were still sound after standing in the ground for forty years, it did not take long to decide on sawn redwood poles especially as the price was nearly alike on equal sizes. As the poles for most lines are ordered but a short time before they are needed on the line and are delivered right from the woods, the use of tar on the butts is of very doubtful value as applying it at that time incloses all the sap contained in the green wood and besides the tar will not penetrate the wood to preserve it. A much better way is to set the pole in line and after a couple of years of seasoning to dig a couple of feet, clean the pole and apply the tar hot during the dry season. This method will afford ample protection as the decay is greatest nearest the surface and for about two feet downward. One feature that it is well to bear in mind in this connection is that when a pole becomes rotten there is no means of ascertaining its exact condition and it is sure to give away at some time of unusual strain when least expected. Were it possible to determine the condition of a decayed pole it might be replaced by a new one without interruption of service for a very long time, but the great difficulty is that it is impossible to tell where the weakness is till it has manifested itself in a break down. In the matter of the size and length of poles that should be used, the ultimate weight of the line, the length of spans and the wind strains will determine the size to be required for safety while the length is a matter that is determined principally by the requirements of the franchise. As to the height of wires, the high line has the advantage of reducing earth reduction and avoiding malicious disturbance and the disadvantage of increased leverage on the butt of the poles and increased cost.

The Cross Arms should be made of the best timber available for toughness to avoid splitting, and of timber that will not warp and should be painted with lead and oil paint to prevent weathering and checking, which is the weak point with them, being full of holes and subject to constantly changing strains. The Cross Arms of the San Joaquin Electric Company are made of Oregon pine, 4x5 inches, dressed and rounded on the upper side, seven feet long with holes for six pine and the pole and brace bolts. It is a better plan to bore only such holes for pins as are needed as a hole is a source of weakness in a cross arm. One great defect in putting on cross arms usually is that the washers under the head and nut of the bolts is made too small and crushes into the wood, weakening the arm. As the strains on cross arms are mainly the tortional strain on the pin which in most cases exceeds the weight to be borne, they should be nearly square in section. Cross arm braces 1x1 3-4 in. iron, bent to give a square seat on the cross arm and the pole bolted with a 3-8 in. bolt through the cross arm and lag bolted to the pole where the other ends intersect have proven very effective.

We now come to the junction point of the mechanical and electrical parts of the line construction and have to deal with the most intricate problem of all, the pins and insulators. Concerning pins as they are a mechanical device, will say that they can be made to meet the requirements, namely, to furnish a stable support for the insulator.

The pin should have a stem that will not pull out of the cross arm, a base to resist lateral strain and a thread to securely hold the insulator. These conditions can best be met by a composite pin which may be made up of a bolt passed through a wooden threaded pin with a broad base, or which is better, a lead thread on a bolt supported on a metal base and tightened by means of a nut and broad washer under the cross arm. One of the great objections to wooden pins is that, in order to give them strength, a very large hole must be bored through the cross arm, thus weakening it and that during the dry season the pins shrink and become loose in the holes and that during the wet season they swell and crack the cross arms. The great advantage of a bolt for a pin lies in the fact that it can always be kept in place. It does not injure the cross arm, and requires a much smaller hole leaving the cross arm stronger. The pins should never be made so that the threaded portion touches the insulator as it is liable to split the insulator by reason of expansion.

The insulator, the most important point at the present time in line construction is now receiving the widest attention from the electrical fraternity. From the experience of the few years of high tension transmission it is well known that it is only the mixture of insulators and water that has given any special trouble. Most any type of insulator will make a fair weather insulator, but it is the storms and the fogs of the wettest kind of weather that must be prepared for. Manifestly the type of insulator that will absolutely insure a dry gap between the line wire and the ground under all possible conditions is the one being sought for. Great stress has been laid on points in this or that type of insulator on account of the amount of surface the current would need to travel over to reach a ground on the pins, while the vital point of imperviousness to water has been overlooked in its manufacture. In California we have all the conditions of weather that exist anywhere and in some cases conditions that are worse, in so far as continuance is concerned, than in the eastern climates. I refer especially to daily and long continued sea and land fogs. The portion of our lines on the plains was submerged in fog for fifteen consecutive days and nights last winter, winding up with a severe driving rain. These fogs drift along slowly in a line parallel with the ground and condenses on all intervening objects so that all things that will absorb moisture at all become entirely water logged on the side facing the breeze though they will remain comparatively dry on the leeward side. Looking at the problem in this practical way leads us to the point of determining the mechanical design of an insulator to accomplish the desired results.

It must be impervious to water as a water shed or roof to keep the water out of the body of the insulator, it must have a dry gap between the roof and the pin, and must be mechanically strong to resist the strains to which it is subjected by the line.

Another element to be taken into careful consideration is that of the detail of the line construction. The right of way should be cleared clean of all brush and grass at least ten feet each side of the line, and all trees of whatever kind that reach the line in falling should be cut down. A right of way at least twenty feet wide should be secured to give ample room for construction, maintenance and protection of the line from fires.

The distance apart of the poles should be determined by the topography of the country passed over, the size of the poles and the weight to be carried on them, and the other strains to which the poles are subjected.

In the case of the San Joaquin Electric Company's line the distance apart in the hill portion is about 110 feet though it was varied from 80 to 130 feet to conform to the ground, such as passing over creek beds, and avoiding very hard rock, etc., while on the plains the distance is 120 feet apart, varied so as to miss roads and ditches. The excavation of holes for poles is quite an important element in the cost of line construction, and the method to be pursued depends on the character of ground. A large part of the country crossed by the San Joaquin Electric Co.'s lines is either hard or soft granite, rock, or granite or hard pan overlaid by a shallow bed of earth. It was found cheapest to make giant powder do the loosening of both rock and earth. In rock two shots were put in while in earth surface the top was removed by means of digging bars and shovels and the bottom loosened by one shot. A shot consisted of a stick or part of a stick of giant powder put in the bottom of a hole drilled by means of a churn drill operated by two men.

The cross arms, braces, pins and all bolts should be put into the pole while on the ground so that when it is raised it will be ready to receive the insulators. Pike poles for raising the poles in a hilly country and a derrick on a truck in a level country where the line is accessible will be found most effective. Great care should be taken in tamping in the earth around the pole as there is a tendency among workmen to hurry the filling at the expense of proper tamping.

It is difficult to get insulators erected properly on wooden pins as the pins must be nailed in to hold them in dry weather and insulators with a single groove for the line wire will often lack a quarter turn when fully screwed in of being in alignment in which case the lineman will turn them back till the groove is right, leaving the pin loose in the insulator. The San Joaquin Electric Company has had as much line trouble from this one cause as from all the others combined and while it does not often short circuit the line, it requires shutting down one line to reset the insulator. If bolted pins are used the insulator can be screwed down tight and the nut of the pin tightened when the insulator is in alignment.

Albuquerque, N. M.—City Trustees are contemplating the putting in of an eletric alarm system.

Los Angeles, Cal.—Council.—Permission was granted the West Side Lighting Co. and the Sunset Telephone Company to erect wires.

Prescott, Ariz.—About 20 of the telephones of the Prescott Electric Company were destroyed by lightning a few days ago.

Los Angeles, Cal.—The Pacific Telephone and Electric Co. Capital, $200,000. Directors: T. M. Gibson, H. J. Lloyd, P. L. Griffen, et al., of Los Angeles.

San Francisco, Cal.—The Girard Water Wheel Co., at 34 and 36 Mission street, has been attached by the Sheriff to secure a claim of the Electric Engineering Co., amounting to $7168.64.

Monroe, Ore.—A representative of the telephone company has made n proposition to the business men to run a loop from Harrisburg to Monroe.

Brooks-Follis Electric Corporation. Formed to deal in electrical appliances, etc. Directors: J. H. Follis, R. H. Follis, H. Brooks, E. A. McInerney, J. W. Brooks, all of San Francisco. Capital stock, $25,000.

Redwood City, Cal.—The San Mateo and Coast Line Telephone Company had its lines to the valley of the Purissima last week.

Long Beach, Cal.—Stockholders of the Long Beach and San Pedro Electrical Co. will hold a meeting on November 15th at 2 p. m., to consider the proposition of creating a bonded indebtedness of the corporation to the amount of $25,000. Iva E. Tutt, Secy.

NEWS NOTES

POWER.

Los Angeles, Cal.—The Southern California Power Company has purchased from the General Electric Co. three 525 k. w. triphase generators, also three 500 k. w. motors.

The Fort Wayne Company has sold to the San Antonio Light and Power Company a 10 h. p. single-phase motor.

San Jose, Cal.—J. W. Chute of San Jose has purchased a 5 h. p. Fort Wayne motor.

San Francisco, Cal.—The Central Light and Power Company has purchased from the Fort Wayne Company a 2½ h. p. motor and 50 arc lamps The Mutual Electric Light Co has purchased from the Fort Wayne Co. transformers of 1500 light capacity.

Bakersfield, Cal.—The Power Development Company has purchased two 5 h. p. General Electric motors.

Spokane, Wash.—The Washington Water Power Company has purchased from the General Electric Company a 3 and a 10 h. p. motor.

San Diego, Cal.—The San Diego Electric Railway Company has purchased a 20 h. p. General Electric motor.

Riverside, Cal.—The Riverside Trust Company has purchased a 20 h. p. General Electric motor.

Bakersfield, Cal.—The General Electric Company has sold the Gas and Electric Company a 50 h. p. motor.

Fresno, Cal.—Seropian Bros. have purchased a 10 h. p. General Electric motor.

Fresno, Cal.—The San Joaquin Electric Company has purchased a 3 h. p. General Electric motor.

Seattle, Wash.—The Union Electric Company has purchased a 2½ k. w. generator.

Los Angeles, Cal.—The Hayden L. Lewis Company has purchased a 5 h. p. motor.

San Francisco, Cal.—W. H. Bink & Co. have purchased from the General Electric Company a G. E. 200 railway type motor.

Portland, Ore.—The Portland General Electric Company has purchased a 60 h. p. 300-volt General Electric motor.

San Jose, Cal.—The San Jose and Santa Clara Railway Company has purchased a 7 h. p. motor from the General Electric Company.

Riverside, Cal.—L. P. Hanson of the Lake View tract contemplates putting in an electric pumping plant shortly.

Redding, Cal.—W. J. Hunt filed a water right to 500 inches of waters of Mill creek, to be used for motive power at the El Dorado and Eureka mines on Tower Mountain.

The Electric Power & Mining Co., has been incorporated with a capital stock of $25,000. Incorporators, H. W. Goode, W. A. Burkholder, Portland, et al.

Grass Valley, Cal.—The Jeffersonian mine has been sold to N. Y. parties who will commence active operations at once. A mill will be built to be run by electricity.

Salt Lake, Utah.—E. A. Benson and F. H. Corve are making arrangements for a mill on the Daisy mine. If possible, the mill will be run by electric power.

Los Angeles, Cal.—The Santa Monica Electric Power Co., has filed a certificate of increase of capital stock, changing the sum from $40,000 to $100,000.

Asuza.—The San Bernardino Co. is thinking of developing an electric light and power project, and F. C. Finkle is making a preliminary survey.

S. F. Call, Aug. 13th.—J B. Peaks and J. C. Wilbur have sold the Syndicate gold property, 12 miles from Raymond, in Madera Co., to J. W. Chipman of Indianapolis, for $100,000. Purchaser will put up a complete electrical plant.

Provo, Utah.—Authority was granted the Telluride Power Transmission Co., for a franchise to erect and maintain electric transmission lines over roads and highways in Utah county.

Olympia, Wash.—Articles of incorporation of Light & Power Co., of Olympia have been filed. Object to improve Des Chutes water power at a cost of $10,000.

Eureka, Utah.—Jesse Knight intends to run his line by electricity. The completion of the line for transmission of power into Tintic is promised for next May.

Manti, Utah.—Sufficient head for water power has been procured by the Union Roller Mill Co., to produce surplus power, more than sufficient to properly run the mill, which power will be used to operate an electric plant for lighting the city.

Auburn, Cal.—The Hidden Treasure Min. Co. is putting in a $16,000 electric plant. The electricity is to be generated by water power and will be used in operating the Dam mine at Centerville, and for lighting the town.

Sacramento, Cal.—The Yuba Electric Light, Power & Irrigation Co. Principal place of business, Sacramento. Capital, $160,000. Directors, J. Markley, Geyserville; W. Longbottom, H. Johnson, F. D. Ryan, W. W. Bassett of Sacramento.

Butte and Big Hole Electric Power Co., by E. Cowen, P. R. Dolman and R. McBride. Object to furnish light and power to the city of Butte and other towns, etc. Capital stock, $10,000. Principal place of business, Butte, Montana.

American Fork.—Two representatives of the Provo Power Co., have been making arrangements for a franchise with American Fork.

Nevada City, Cal.—Mgr. H. K. Shockley of the Phoenix Mining & Improvement Co., is having the old hoisting and pumping plant reconstructed. The machinery will be run by electricity or water power, as may be determined later. It is anticipated that the machinery will be in readiness by the middle of October.

San Bernardino.—The Lytle Creek, Light & Power Co., has filed a claim to 3000 miners inches of water of middle fork of the Lytle Creek Canyon for the purpose of generating power for transmission of electricity.

City of Mexico.—A company has been organized to construct works for the conversion of water power into electrical energy, for the purpose of supplying power and light to this city and Pachuica. Capital, $600,000. Hon. Francisco Espinosa has a concession from the government for the work. Thos. Braniff is president of the Co.

The American Wave Power Co., formed to deal in electricity, etc. Principal place of business, San Francisco. Directors, A. C. Goldner, J. Goldner, J. M. Dyer, et al. Capital stock, $1,000,000.

Riverside, Cal.—Work has been commenced on the transmission line down Victoria avenue. The building of this line will enable Mr. Tiving to carry out his plans for pumping water from the Gage canal by electric power for irrigating mesa lands below the canal.

Tuolumne County.—The Stanley Electric Manufacturing Company has secured the contract to install a three-phase electric-power transmission system for the Rawhide Mining Company, whose mines are near Jamestown, Tuolumne county, Cal. The generating plant will be located near Sonora, and will be operated by the water of the Tuolumne River, under a working head of about 500 feet. Included in the equipment are three special three-phase Stanley generators all switchboard apparatus and transformers, for stepping up to 15,000 volts for transmission 15 miles, and down again to 2,000 volts for the large induction motors; also to still lower voltage for the smaller motors. The Rawhide and the App mines will be operated and lighted by the new installation.

Salt Lake, Utah.—Excavations have begun for the big cyanide mill to be erected at the Chloride Point mine. The power for mining the mill will be furnished by electricity. Cost of the plant will be between $25,000 and $30,000.

Napa, Cal.—The Clear Lake Electric Power Co., expects to commence securing provisional contracts to furnish power, and if they secure enough to justify their starting, will have their lines and works in operation in a few months.

Willows, Cal.—Development of electric power from Stony Creek is again being talked about. R. S. Masson, Dist. Engineer of the Westernhouse Co., estimates that an electric plant on Briscoe creek would cost $5,800, electric power station on Elk creek, $5,800. A building will be needed to hold the electrical apparatus and wheel, etc.

Jackson, Cal.—It was expected that the Jackson ice plant of John Strohm's would be started up with power supplied by the electric plant of the Blue Lakes Water Co., this month. The electric wires were strung along the poles as far as the brewery, but Mr. Strohm then informed the Co. he would not start the works before next year. Next year he will be prepared to commence operations in good shape.—Republican.

Chico, Cal.—Col. J. W. Hartzell has returned to Chico for the purpose of furthering his plans to erect an electric light and power plant at this place. His plan is to develop the water power in Chico canyon for the purpose. O. T. Webber, President of the West Shore Ry. Co., will, in connection with an electric Co. of S. F., furnish capital for putting in the plant, erecting poles, running wires, etc.—Enterprise.

Marysville, Cal.—John Martin of San Francisco announces the immediate construction of an electric plant in the foothills 20 miles from Marysville, for the purpose of supplying light and power to Yuba and surrounding counties. The plant is to be in operation by April 1st, next. The mines of Brown's Valley mining district, 12 miles from Marysville, will receive the power service. The plant will consist of a 1500 h. p. installation in three units of 500 h. p. each. The Stanley system will be employed in the generation and transmission of the electric current. The plant will require an immediate expenditure of $225,000. It is expected to supply power to the mines at Browns Valley for pumping and milling works.

Oroville, Cal.—The Nimshew Gold Mining & Power Co., represented by T. O. Carter, has a plan by which it proposes to generate the equivalent of 3000 h. p. in electricity for use in the mill and mine. The intention of the Co., is to extend the line of wires from the mine direct over the hills to Chico, so as to supply both light and power to that city. Distance is 20 miles. Chicago people will furnish the capital and the work will be pushed .

Riverside, Cal.—Several new applications for electric power have been received by the Board of Trustees. Harry Bantz, Mr. Miller of the planing mill, and Mr. Jackson of the bonemeal mill have applied. Mr. Bantz has a 10-h. p. dynamo and will increase it to a 20 h. p.. Mr. Miller intends to put in a 20 h. p. dynamo and Mr. Jackson has applied for power to run a 30 h. p. dynamo. The applications will be considered by the Light Co.

Merced, Cal.—There is a scheme on foot to establish an electric plant, to be run by water power on the Merced river, for the purposes of furnishing Merced with electrical power and light. The power will be transmitted on a large electric wire to Merced and from here distributed to all portions of the city. Jas. Ruddle of the Merced City Flouring Mills is one of the leading movers in the enterprise, together with capitalists of Sonora.

Butte, Mont.—M. S. Parker of Great Falls has been engaged as surveyor and engineer for the Mont. Power Co., recently incorporated. Construction on dam for the electric power plant will be commenced at once. A power house 212 feet long will be installed. 6,000 h. p. will be transmitted to Butte. H. M. Byllesby, Gen'l. Mgr. of Butte Electric Co., is a large stockholder.

Salt Lake, Utah.—Articles of incorporation of the Union Light & Power Co., the new Co., which has resulted from the consolidation of the Pioneer Electric Power Co., the Salt Lake & Ogden Electric Light Co., the Citizen's Electric Light Co., the Cottonwood Water Power & Electric Co., and the Big Cottonwood Power Co., have been filed. Capital stock, $4,550,000. Directors, G. Q. Cannon, J. F. Smith, J. P. Winder, F. J. Cannon, et al. Offices of the Co., will be at Ogden.

Salt Lake, Utah.—Arrangements have been on foot for some time to convey power to Tintic from Provo canyon. The line will run along the north end of Utah lake and around to Fairfield, where a sub-station will be put in, one branch coming to Tintic and the other going to Mercur, where the Golden Gate will use 500 h. p. and 12 motors. All the crushers hoists and other machinery around the mine and mill will be run by electricity.

Chico, Cal.—Col. Hartzell has investigated the power (water power of Chico canyon). He laid the matter before a capitalist and he and his associates and an electrical company have signed an greement to put in a transmission plant in Iron Canyon. A survey is now being made of Iron Canyon. Strong resolutions were passed assuring support to new electric light people, Oscar T. Weber of San Francisco and his associates. The plant will supply light and power for all purposes to Chico. It will be an electrical transmission power plant.

Merced, Cal.—Jas. Ruddle of the Merced City Mills, who is interested in the establishment of the proposed new electric plant at Merced Falls, has been interviewing people of Merced and vicinity in regard to the proposition and has met with considerable success. The plant will be located at Merced Falls, about 17 miles from Merced. A large and fully equipped light and power plant will be put in and large wires will connect Snelling and Merced with the power house. The company will furnish power as well as lights.

Bakersfield, Kern Co., Cal.—The surveyors in the employ of the Kern River Co., formerly known as the Kern River and Los Angeles Electric Power Co., have completed the survey of the transmission line as far as Hawilah. Californian, Aug. 18th.—The Bakersfield Gas and Electric Light Co. has decided to put in meters for all consumers wishing them. Houses are being wired for actual cost. Rates for electric lights will be the same as in San Francisco—20 cents per 1,00 watts. There are very few in San Francisco who pay 20 cents now.

Auburn, Cal.—Notice is given that application has been made to the Supervisors of Placer county, for a franchise to erect and maintain poles, etc., on which to place wires for the transmission of telephone, telegraph and other messages, along streets, highways, etc., in Placer county. Bids will be received for said franchise up to 10 a. m. October 7th. Bond in the sum of $2000 must accompany each bid. Right reserved to reject any or all bids. Wm. I. May, County Clerk

The Electrical Appliance Company of 242 Madison street, Chicago, has issued the best and most complete catalogue of electic light, power and railway, telephone and telegraph supplies that we have recently seen. It is a large volume of 567 pages and has a good index.

San Bernardino, Cal.—Board of Managers of Southern Cal., State Hospital will receive bids until 2:30 p. m., Sept. 14th, at the Hospital, for 20 electrical h. p., for mechanical purposes and power to furnish not to exceed 550 incandescent lights of 16 candle power each, and contractor to furnish and maintain all electrical apparatus, plant, machinery, wire and all applinces of every kind and description necessary to supply and deliver to the wires to be installed in the buildings. Right reserved to reject any or all bids. Mark R. Plaisted, Treasurer.

RAILROADS.

San Francisco.—The Market Street Ry. Co. has purchased six G. E. 800 motor equipments.

Tacoma, Wash.—The General Electric Co. has sold the Tacoma Ry. Co. four G. E. 53 motor equipments, also four similar equipments to the City Park Ry. Co.

Sonora.—It is said that Messrs. C. Echeverria & Co. will shortly put in an electric street car line at Hermosillo, Sonora, Mexico.

The Market Street Railway Company has had men at work on the route of the Park and Ocean steam road, preparing for the changing of this system into an electric line.

San Pedro.—It is rumored that a route is being surveyed from Los Angeles to San Pedro via Long Beach, for the construction of an electric car line. It is said that the stock has all been sold, and the prospects are that work will soon commence.

Yuma, Ariz.—Late advices report that a scheme is on foot in the East by capitalists for the construction of a three-rail trolly line from Yuma, Ariz., up the west bank of the Colorado River, to Potholes, Buena Vista and Picacho, important mining camps.

Los Angeles, Cal—The replevin suit of the General Electric Co. vs. the Citizens Traction Co. will be dismissed. The road will be sold at auction at not less than $40,000, although the rival street car company owned by Spreckels, wants to secure it.

Los Angeles, Cal.—The Los Angeles and Pasadena Inter-Urban Co. intend to build a car line to a tract of land they intend to improve between Los Angeles and Pasadena. Gas and electric lights will also be provided. J. M. Thompson, W. S. Maxwell et al. are directors.

Los Angeles, Cal.—Work has commenced on the Eighth street electric line of the Los Angeles Traction Co.

Los Angeles, Cal.—By an arrangement between the Redondo Railroad Company and the Los Angeles Railway Company, the electric line to San Pedro will be built as a joint road, so it is reported.

San Diego.—It is announced that the San Diego and La Jolla road will be converted into an electric line. J. A. Flint and E. S. Babcock are directors of the road.

Redding, Cal.—The management of the Iron Mountain mine will place a dynamo in the mine and run the cars by electricity.

Los Angeles, Cal.—F. A. Wood, general manager of the Los Angeles Railway Company, has asked the council for a permit to allow them to place electric wires for power purposes in what is known as the conduit district, located in the Story block.

Red Bluff.—P. R. Kestner and Henry Thompson have bonded their copper and gold mines to San Francisco capitalists. If the mines are successfully operated, an electric road will be built to Red Bluff. M. C. Conway represents the capitalists.

Perris, Cal.—A meeting of citizens was held recently to discuss the electricity question. It is understood the line will be built to Lake View, thence to Newport's ranch. Professor Baldwin, F. J. Fogg et al. are interested in the question.

Santa Monica, Cal.—The prospects are that the Traction Company will have their electric cars running to Ocean Park before the end of the year. They have secured the right-of-way.

Sacramnto, Cal.—The building of the contemplated electric road from Sacramento to Fair Oaks has been abandoned, as it would cost $400,000.

Pasadena, Cal.—Eastern capitalists have formed a company to build another electric road between Los Angeles and Pasadena by way of Estudillo Canyon.

The San Mateo Electric Railway will shortly begin the work of laying a double track from San Jose avenue and Thirtieth street to San Mateo and Baden, a distance of seven miles.

Provo.—There is some talk of an electric railway for Provo, upon the completion of the power plant in the canyon. No definite action has been taken yet.

Riverside, Cal.—On motion of Trustee Bordwell, the matter of the extention of the eiectris line to Arlington Heights was referred to the electric light committee with power to act.

Butte.—The street railway company is figuring on substituting an electric line for the present cable system which they are running up the hill.

Oakland.—The Realty Syndicate is beginning to centralize the management of its recently acquired street railroads. L. H. Wolf, who has been in charge of the electrical work of the consolidated system, will have charge of the electrical work of all of the lines.

The agency of the Walker Company for Southern California has been given to the Wybro & Lawrence Co.

LIGHTING

Albany, Ore.—The Albany Electric Light & Power Co. has purchased a 35 light General Electric arc dynamo.

The General Electric Co. has sold a 12 k. w. Edison dynamo to the Washington Home for Defective Youth.

Santa Barbara, Cal.—The Santa Barbara Electric Light Co. has purchased a 60 k. w. General Electric alternator.

San Francisco.—The Golden State & Miners' Iron Works has purchased a 4 1-2 k. w. General Electric lighting plant.

San Francisco.—The General Electric Co. has sold a 3 1-2 k. w. generator to Schwartz Bros.

San Francisco.—The Union Iron Works has purchased a 4 1-2 k. w. generator from the General Electric Co.

Stockton.—The Stockton Gas & Electric Co. has purchased a 120 k. w. alternator from the General Electric Co.

The United States Navy has ordered two 16 k. w. General Electric marine plants.

Vacaville, Cal.—The Vacaville Water & Light Co. has purchased two 30 k. w. General Electric generators.

The General Electric Company has sold the University of Oregon a 9 k. w. generator.

Wadsworth, Nev.—H. W. Esden has purchased a 30 k. w. General Electric alternator.

Bakersfield.—The Kern County Land Co. has purchased an 80 h. p. General Electric generator.

Sonoma County.—The General Electric Co. has sold the Home for Feeble Minded Children a 30 k. w. lighting plant.

Idaho.—The Bunker Hill & Sullivan Mining Co. has purchased a 55 k. w. generator and a 75 k. w. alternator from the General Electric Co.

Truckee, Cal.—The Truckee Electric Light Co. has purchased a 60 k. w. General Electric alternator.

Bisbee, Ariz.—The Copper Queen Con. Mining Co. has purchased a 35 k. w. General Electric generator.

Yountville, Cal.—The General Electric Co. has sold the Veterans' Home Association a 7 1-2 k. w. generator.

San Francisco.—The General Electric Co. has sold the Union Iron Works for the cruiser Wisconsin four 35-inch projectors, also four 24-inch projectors for the Japanese cruiser.

Pullman, Wash.—H. J. Jackson states that he will be prepared to furnish electric lights by October 1, and will commence wiring at once.

Ukiah, Cal.—The Mendocino County Electric Company has been granted franchises to erect poles and maintain wires along certain streets.

Challis, Idaho.—Col. N. J. Sharp says a new dynamo will be put in the Silver Creek mines, to furnish power.

Wadsworth, Nev.—The ditch for the new electric plant is now under construction. Henry Esden is interested in the plant.

Truckee, Cal.—Directors of the Electric Light Company have decided to put in a new plant and furnish incandescent lights. It will require about $3,000 to put in the new plant.

San Jacinto.—Work is progressing on a building to be used as a power-house for San Jacinto's electric light plant.

Etna, Cal.—The Etna Development Company are negotiating for an electric light plant

Sonoma.—A joint stock electric light company has been formed here to supply business houses and private dwellings with electric light service.

Chico, Cal.—As there were no bids for an electric light franchise, the matter was dropped.—Record, Sept. 8.

Sumpter, Ore.—Present electric plant is to be enlarged

Vernon, B. C.—City council has passed by-laws to build a City Hall and put in electric lights.

Saginaw, Ariz.—The Saginaw Lumber Company will put in electric lights at the mill, factory and principal houses

Oakland, Ore.—Citizens are agitating putting in an electric light plant.

Ballard, Wash.—Plans were made to enlarge the engine house to accommodate the electric light plant.

Wallawa, Ore., is soon to have an electric light plant.

Stockton, Cal.—At the electric light works the excavations have been made for the foundation of an extension to the the power plant. The plans for the building are being changed.

Logan, Utah.—Mr. Christian Garff, who was recently awarded a franchise for furnishing electric light to Hyrum, is perfecting his plans.

Salem, Ore.—Appropriation of $20,000 has been made by Congress for erection of brick school for Chemawa Indians. There will be a steam heating plant and electric light plant put in next year.

Ellensburg, Wash.—City Council is considering the proposition of constructing a system of water-works for supplying the electric light plant with power.

Red Bluff, Cal.—A survey was ordered of the entire town for the purposes of street work, sewer construction and a possibility of a municipal waterworks system and electric lighting plant.

Payson, Utah.—An appropriation of $2,000 was made to purchase the plant and fixtures of the Payson Electric Light Co., from T. G. Wipuner, assignee.

Kaslo, B. C.—The Kootenay Electric Co., have a force of men constructing a new water power plant on the Kaslo Creek. An entire new outfit will be put in—dynamos, transmitters, switchboard, etc.

Wadsworth, Nev.—Mr. Stockdale, of the General Electric Co., spent several days here recently looking over the town and making estimates on the cost of an electrical apparatus that will be required for the light plant.

Springville, Utah.—An election will be held this fall at which will be submitted a proposition to issue bonds for the purpose of putting in an electric light plant.

Ogden, Utah.—Council—A resolution was introduced by Councilman Pierce, authorizing the city recorder to advertise for bids for lighting the city.

Riverside, Cal.—City Assessor's estimate of expenses for the city for the ensuing year, includes $3,800 for extension of the electric light system.

Reno, Nev.—Council—The election matter was taken up, relative to calling an election for issuance of bonds to construct a water and electric plant for the city of Reno. On motion of Mr. Ruhe the sum for water was fixed at $130,000 and for light purposes, $20,000.

San Diego.—The Clerk has been instructed to advertise for bids for lighting the city from April 1st, 1898. The advertising for bids so far in advance, afford an opportunity to other companies outside of the city to establish a plant.

San Francisco, Cal.—The Bay City Electric Light & Power Co., has leased for 10 years, with the privilege of purchasing 2 lots on Hyde street, between Jefferson and Beach streets. The premises are to be prepared for the generation of electricity. Among those back of the project are W. F. Harris, O. F. Von Rhein, Wm. Cluff.

Long Beach, Cal.—It is now pretty certain that a hotel will be built at the corner of Ocean avenue and the alley west of Locust street, to be lighted and have the elevator run by electricity. Power will be supplied from the old electric plant house, which will have another dynamo.

Seattle, Wash.—Jugde G. H. Hanford of the Federal Court has appointed a receiver for the Tacoma Gas and Electric Co., of Tacoma. Application was filed by J. H. Shackleford of Tacoma, representing the N. Y. Security & Trust Co.

Eugene, Ore.—Improvements will be made at the State University. A 25 h. p. engine will be placed and a new dynamo will be installed.

Boise City, Idaho.—Gov. Steumenberg states that an electric light plant will be put in the penitentiary. It has not yet been decided whether they will contract with electric Co., or put in plant of their own.

Grand Forks, B. C.—Sealed bids will be received up to Sept. 25th for a complete system of waterworks and electric light plant. Plans and specifications to accompany each bid. Right reserved to reject any or all bids. L. A. Manly, Chairman.

McMinnville, Ore.—R. Jaconson & Co., are figuring on independent light plant for their building. Plan is to put in water motor and small dynamo and the power may also be used for an elevator.

Merced, Cal.—J. G. Ruddle of Snelling and an electrician from S. F., were in Merced last month canvassing the town in the interest of a proposition to bring electric light from the Merced river. They met with encouragement.

Salt Lake, Utah.—Mercur is to have electric lights. The thoroughfares are to have a dozen arc lights. Power will be derived from the Jordan River Electric Generating Co., of which A. G. Lamson is Mgr. Council issued a franchise to Col. S. B. Milner.

San Leandro, Cal.—Electric Light Co., representatives were present and proposed to erect a first-class plant at a given sum and furnish electric lights at an agreed price for 10 years and allow the city to purchase plant at any time within 10 years.

Sonoma, Cal.—At a meeting of the stockholders of the proposed electric lighting Co., to furnish Sonoma with electric lights, it was decided to go ahead with the project, provided the people of Sonoma would co-operate with the projectors by using incandescent lights. C. F. Leiding, H. H. Granice, et al., have subscribed to the capital stock of the Co.

Long Beach, Cal.—The electrical works are soon to be brought back from San Pedro and re-installed in the building formerly occupied. When re-located in Long Beach, a tubular boiler will be put in of 150 h. p. The Co., decided yesterday to issue bonds for $25,000 to secure the capital necessary to carry out the plan for a largely extended supply to consumers.—Exchange.

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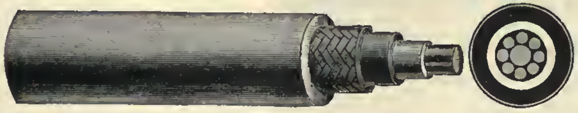

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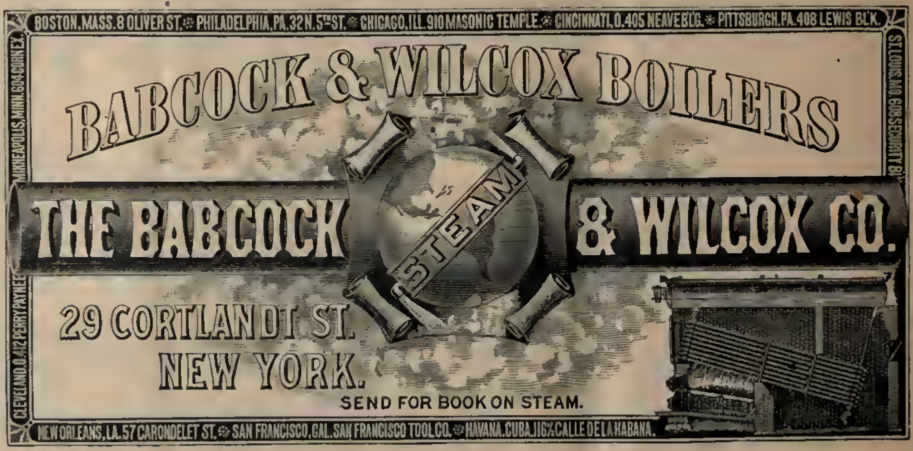

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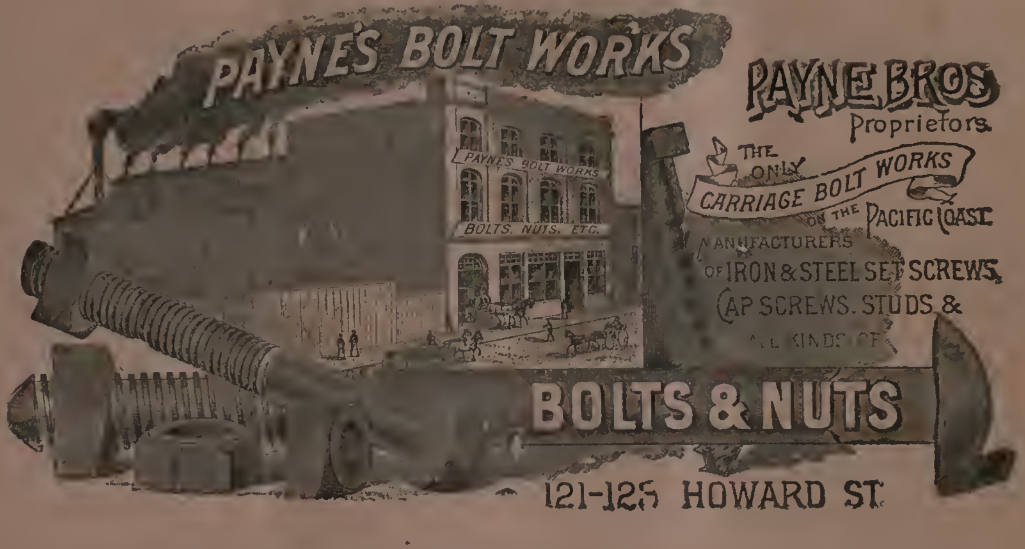
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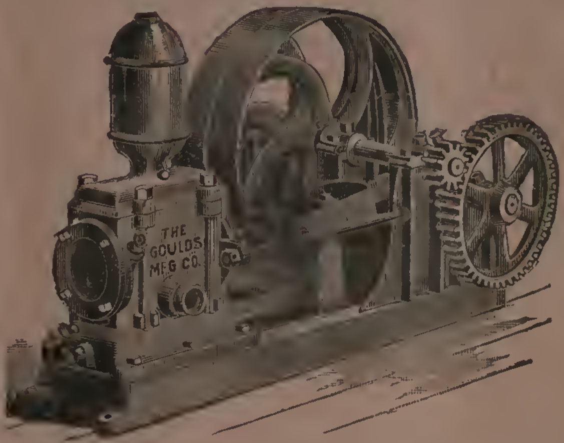
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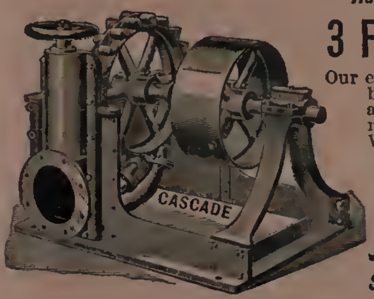

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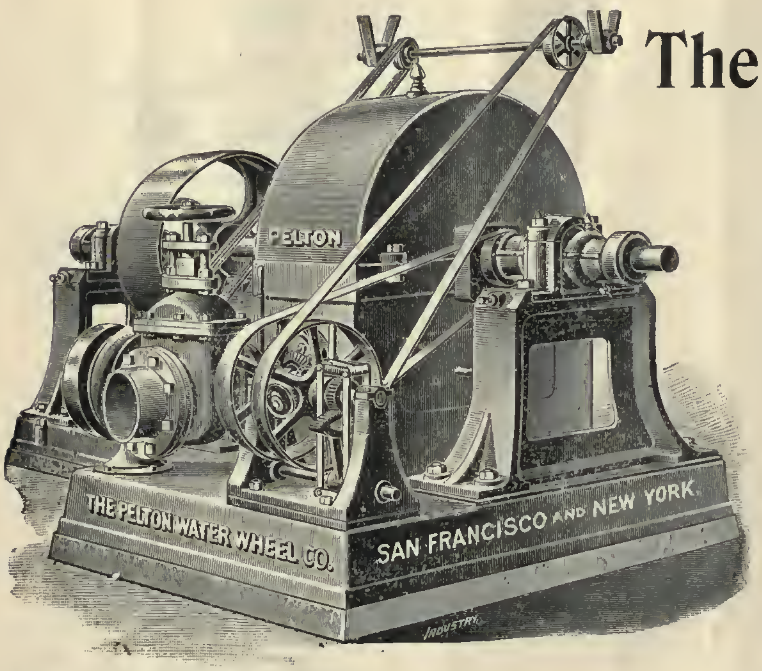
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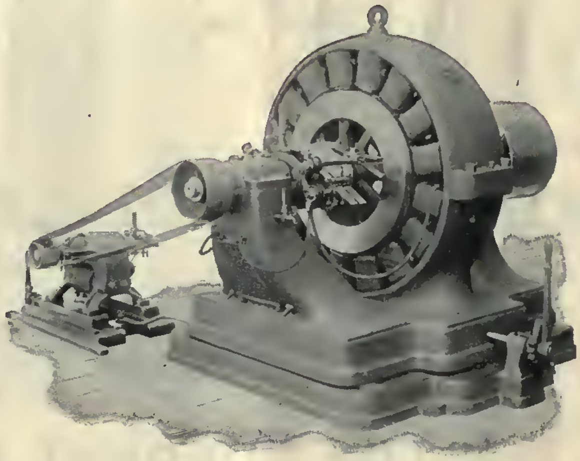

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PACIFIC ELECTRICIAN

VOL. XVIII. OCTOBER, 1897 No. 10

AN INTERESTING COMPETITIVE TEST OF ELECTRIC MOTORS.

Some time since the Pacific Power Co. of this city proposed to a number of the electric companies to hold a competitive test of their motors at the generating station of the Pacific Power Co.

The motors that were entered into this competition were the Eddy, the Crocker-Wheeter, the Westinghouse and the General Electric and Lundell.

The agreed method of making this test was, that each party competing should bolt his motor to the Edison generator, which was used in the power plant of the Pacific Power Co. A speed on the Edison generator of 1320 was adopted as the proper speed, and all parties were asked to arrange the pulleys to operate this generator as nearly as possible to the above speed.

The engineers of all Companies were present during as many tests as they cared to attend. The motors were lined up and started under the supervision of the Engineer of the Company whose motor was being tested; thus the best possible results were obtained in each case, providing, of course, each engineer knew how to get the best results out of his motor which was a condition that had to be assumed, although it may not necessarily have been correct.

The curves that we publish show the result of the test. They were plotted by Mr. Masson, the engineer of the Westinghouse Company, but each point of each curve is shown by a cross or other similar mark, and the figures giving these points are in the possession of the engineers of each company competing, and also the engineer of the Pacific Power Co., who, after checking them up, has approved the curves.

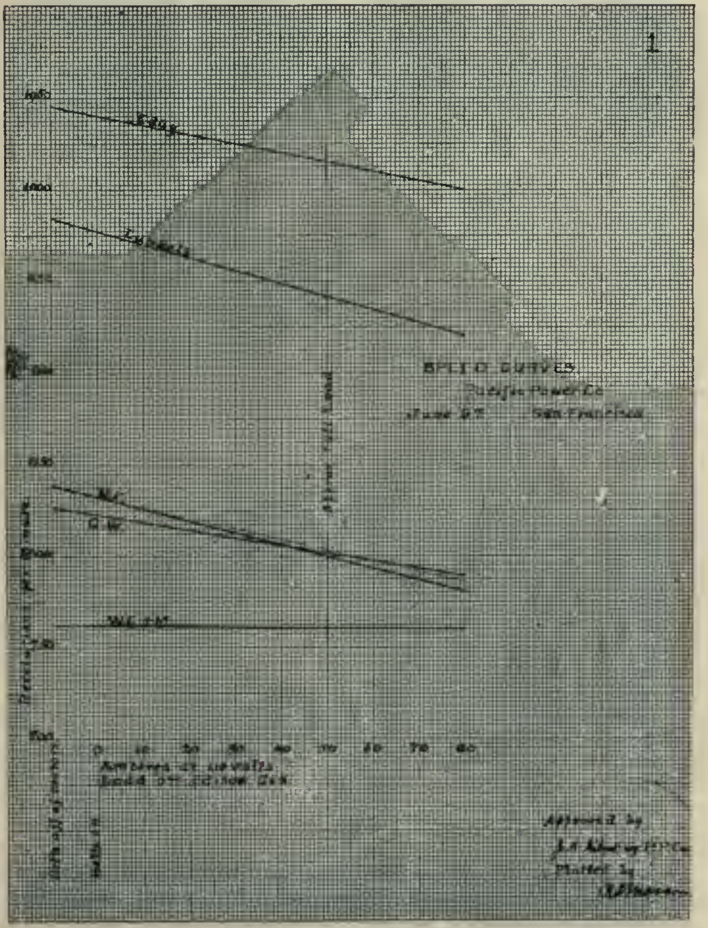


FIG. 1

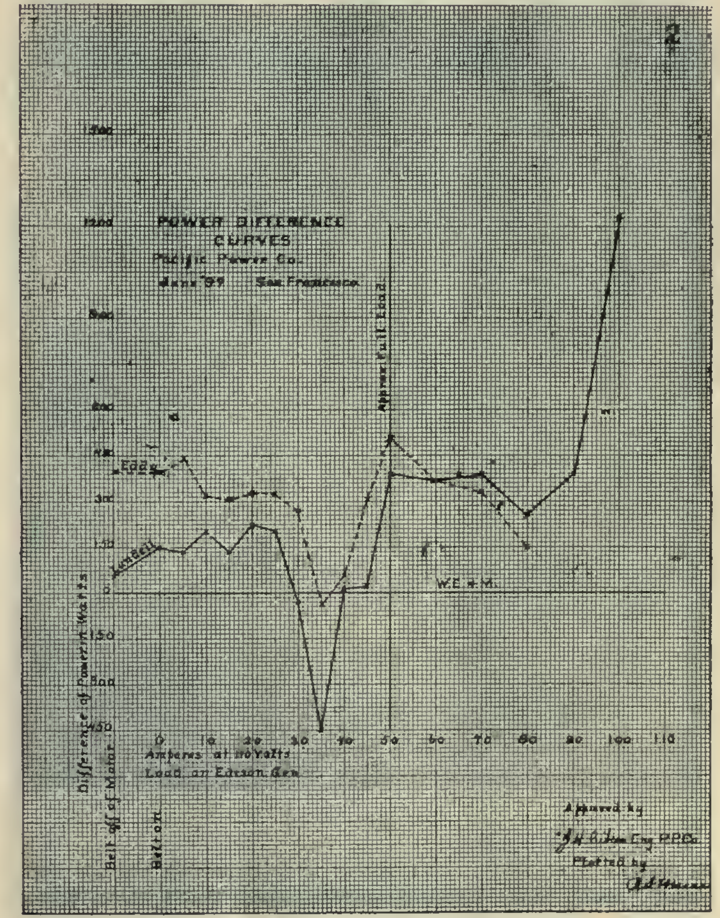


FIG. 2.

Figure 1 shows the speed curves of the different motors in revolutions per minute. It will be noted that while the speed of the Westinghouse motor was the lowest, its operation was very much superior to the other motors. The speed variation between no load and delivering 8.8 k. w. on the Edison generator was 3 revolutions. The Eddy motor dropped 45 revolutions. The Lundell motor 53, and the General Electric and Crocker-Wheeler gave similar results, as shown on the curve.

Each of these curves is plotted with the horizontal divisions representing amperes delivered by the Edison generator. The voltage was in all cases 110 volts. The voltage of the motors was kept as nearly as possible to 500 volts. In this curve the vertical divisions represent revolutions per minute.

The curves in figures 2 and 3 show the difference in watts taken by the motors, as compared with the Westinghouse motor. The Westinghouse motor readings are represented by the horizontal line and the excess of current at each reading is shown by a cross above the line representing the Westinghouse readings; thus in Figure No. 2 we see that at the point where the Edison generator was delivering 50 Amperes at 110 volts, the Lundell motor required 330 watts more than the Westinghouse, while the Eddy motor required 470 watts more than the Westinghouse, and in Figure No. 3 at the same point the Crocker-Wheeler motor required 305 watts in excess of the Westinghouses and the General Electric 605.

At the load of 35 amperes all of the motors fell below the Westinghouse motor. It is plainly suggested from the fact that all the motors fell below the Westinghouse on the same reading, that the Westinghouse reading must have been in error.

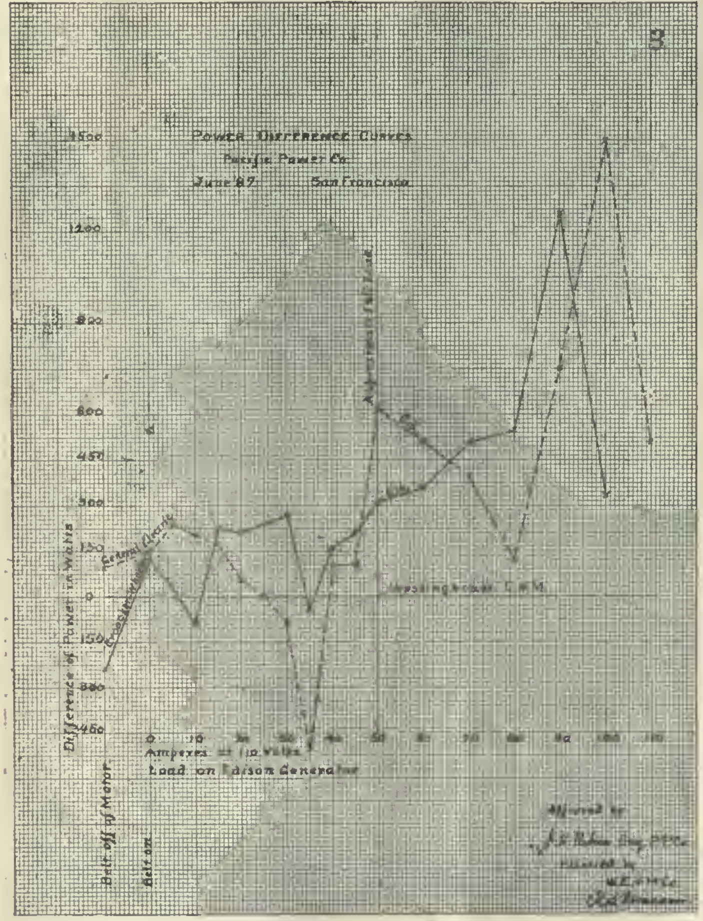


FIG. 3.

The points on the efficiency curve on Fig. 4 were obtained by driving the output of the Edison generator in watts, by the input into the Westinghouses motor. The curve is drawn as nearly as possible through the points obtained by the above method. These points are represented by crosses. As before the horizontal divisions represent amperes on the Edison generator and the vertical divisions percentage efficiency.

It shows that the resultant efficiency is that of two machines, one of which is an old style machine of the Edison type.

Another noteworthy point is that the same motors were used on all tests, but that no account was taken of their absolute accuracy.

The relative efficiencies, however, of the different machines, having been taken with the same motors and under absolutely the same conditions was relatively accurate. All of the motors were of the Weston type.

The curves of the different motors are shown on Figure 4. The points are plotted from the readings taken on the motor.

Colorado Springs, Colo., will be connected with the Cripple Creek gold camp by a short line of electric roads. Council has granted a franchise to Hon. I. Howbert and associates and also the right to derive motive power from the city's water system. Road will be thirty-five miles long and will cost $1.500,000.

At the meeting of the directors of the Market Street Railway Company recently, the proposition made to change the running gear of the roads from steam and cable to an electric system was discussed, but no definite conclusion was reached. It was decided to refer the matter to the engineers, to report at the next meeting.

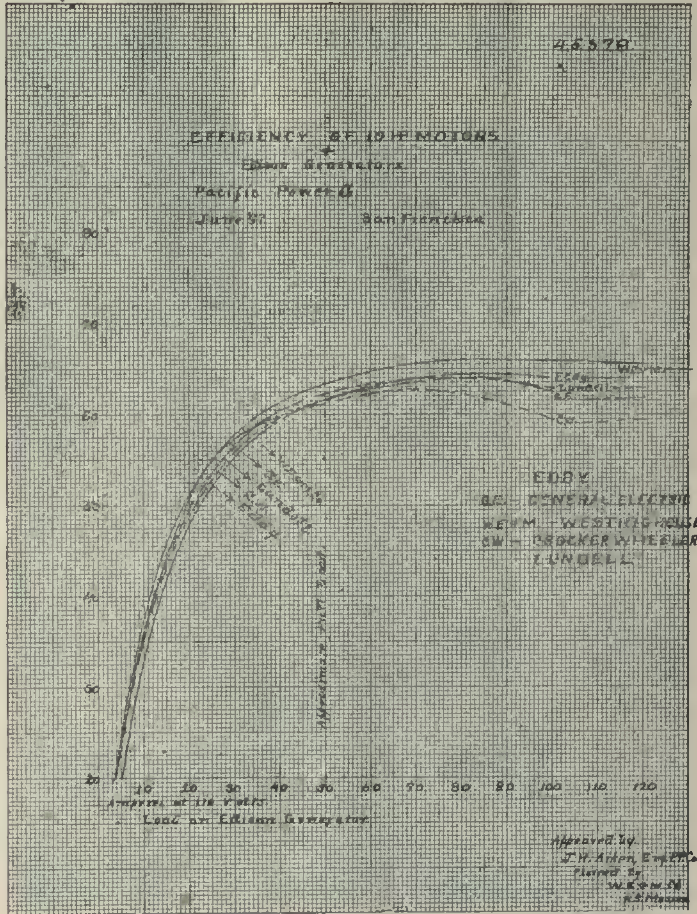


FIG. 4.

S. F. Examiner, Aug. 15th.—If the appropriation for Golden Gate Park is liberal, the Park Commissioners will establish an electric plant and place arc lamps along the principal drives, especially along the main avenue, from Baker street to the Beach. About $25,000 will be needed for the work. Forty-foot masts are favored, with lights of 2000 candle power.

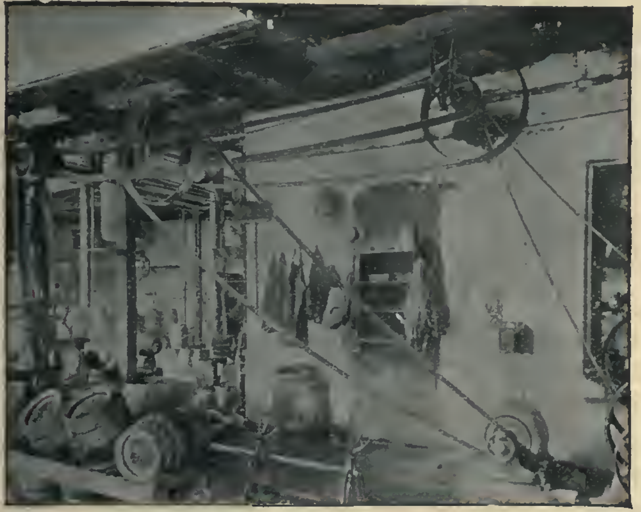
The Examiner should appoint a special Commissioner to secure the news.

ELECTRIC MOTORS FOR BREWERY.

The Buffalo Brewing Company of Sacramento has substituted motors for the steam engines upon which it had previously been dependent for power.

BUFFALO BREWING COMPANY'S BREWERY.

Its present motor equipment consists of one 5 h. p. and 10 h. p., one 20 h. p. and two 30 h. p. motors. They are all of the General Electric Company's three phase induction type, without brushes, collector rings or moving contacts, and run almost without attention beyond an occasional oiling. They are driven by 200 volt current supplied from the 1,000 volt circuit running from the sub-station, a distance of two miles, the pressure being transformed down at the brewery.



TEN H. P. G-E INDUCTION MOTOR IN KEG WASHING DEPARTMENT, BUFFALO BREWERY.

The smallest motor is used in the bottle washing houses; that of 10 h. p. in the keg washing department. The three others are used to operate the blowers, the malting houses and the machine shops. The large ammonia pumps in the brewery will also shortly be driven by electric motors.

In installing the Buffalo Brewing Company motors the question of the probable economy of the change was naturally uppermost. Would it pay to dispense with the steam and trust to the motors. The guarantee finally given, was that electricity would show a saving of forty per cent. After the motors had been running for some time, a series of tests were made, with the result that the saving instead of forty per cent was shown to be actually a little over fifty per cent. Results almost similar have been obtained in other installations in Sacramento. It is hardly a matter of surprise that with such showings to do missionary work, the use of electricity is rapidly extending in that city.

FIVE H. P. G-E INDUCTION MOTOR IN BOTTLE WASHING HOUSE, BUFFALO BREWERY.

SOME RECENT CHLORIDE STORAGE BATTERY INSTALLATIONS.

The Electric Storage Battery Company has closed a contract with the Edison Electric Illuminating Company, of Boston, for a battery of chloride accumulators. This will make the fifth battery in the service of the Boston Edison Company.

Contracts have also been recently closed for central station batteries with the Cleveland Electric Illuminating Company and the Richmond (Va.) Railway and Electric Company, and for batteries for regulation on trolly roads with the Central Railway Company, of Baltimore, and the Potomac Electric Power Company, of Washington. The Potomac Company have been operating a battery of chloride accumulators for about a year. A battery is also being installed on the lines of the Barre & Montpelier Electric Railway, Montpelier, Vt.

Chloride accumulators are being installed in the Reading Terminal Station in Philadelphia to carry the peak of the load, and to furnish current for the lamps burned during the early hours of the morning.

A battery is being installed in the new library building of Princeton University. This battery is to be charged by the town plant between dusk and midnight, and during other hours will furnish the current required for the lamps and for operating three ventilating motors, two elevators and one book lift. The government has recently contracted for a battery for lighting work at David's Island, and has also ordered something over 1,000 cells to be distributed at some twenty odd points for coast defense work.

Chloride accumulators have been installed in the residence of Mr. S. S. Childs, Baskingridge, N. J., where they are being operated in connection with a gas engine-dynamo plant.

D. S. Brown & Co., New York, are installing chloride accumulators for night lighting in their new factory.

THE PACIFIC ELECTRICIAN.

ESTABLISHED 1886.

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Vol. XVIII. OCTOBER, 1897. No. 10

ELECTRIC RAILWAY DEVELOPMENT OF THE PAST TEN YEARS.

In a paper recently read before the New York State Street Railway Association, W. J. Clark has gathered an interesting set of statistics, showing what a wonderful change there has been in the street railways of the American cities in the past decade, and what a remarkable advance has been made in the application of electricity for traction purposes.

January 1, 1888 there were 5,993 miles of street railroad in the United States, of this 5,474 miles were horse car lines, and only 86 miles electric.

January 1st, 1897, there were 15,250 miles of street railroads in operation, of which 1,010 miles were horse car lines, while 13,580 miles were electric.

The cable roads during that period had increased from 217 miles to 515 miles, while steam dummy lines had fallen from 216 to 145 miles.

Ten years ago there were 21,786 horse cars in use where now there are but 3,664, while the electric moter cars have increased from 172 to 37,097.

This is a remarkable showing, especially when we take into consideration the fact that during four of the ten years the country was going through a financial and industrial depression of unexampled severity.

Los Angeles Herald, Sept. 24th.—Work will be pushed on the new electric light plant at Anaheim as fast as possible. E. C. Sharp is supervising engineer.

We are glad to learn that the Anaheim plant has a supervising engineer. From the persistent way in which it has failed to operate we judged that there would be a certain shyness on the part of anyone claiming the honors of responsibility for its working.

The Bakersfield power transmission plant has not been doing a rushing business since it began operations.

There has also been considerable trouble with the water wheels.

COMPARATIVE STATEMENT OF AVERAGE WAGES AND SERVICES REQUIRED OF STREET RAILWAY EMPLOYEES OF NEW YORK STATE.

The following table taken from a paper read before the New York State Street Railway Association is interesting as showing how in New York State, during the past decade, the working hours per day of the employees on the street railroads have been reduced while the wages per hour have been increased, leaving in most cases a net increase per days work:

	1887		1896	
	Wages. Per Hour.	Hours. Per Day.	Wages. Per Hour.	Hours. Per Day.
Conductors	$0.141	11.79	$0.159	10.62
Drivers	.141	11.97	.183	10.40
Starters	.184	11.14	.182	10.90
Watchmen	.142	14.09	.145	11.22
Switchmen	.142	10.68	.143	10.44
Roadmen	.158	10.29	.153	10.20
Hostlers	.131	11.52	.145	10.57
Blacksmiths	.252	10.11	....	.....
Carpenters	.248	10.14	.200	10.00
Painters	.241	10.22	.200	10.00
Harness makers	.225	10.00	....	.....
Inspectors	.217	10.70	.235	9.50
Car cleaners	.148	10.50	....	.....
Tow boys	.109	12.31	....	.....
Trackmen	.172	10.50	....	.....
Repair men	.264	10.00	....	.....
Foremen	.215	11.50	.200	10.00
Engineers	.220	11.33	.243	10.37
Motormen	.095	14.00	.161	10.72

During this period the cost of living has been steadily falling. It shows a condition of affairs considerably at variance with the popular idea.

We note in our news columns an item that indicates that the promoters of the proposed 100 mile transmission line from the Kern river to Los Angeles are in earnest and are really spending money to carry out their scheme.

With two transmission plants a certainty, the Southern California and San Gabriel—and another being worked on Los Angeles will shortly be fairly supplied with electric power.

The "Engineering and Mining Journal" publishes an article by a Mr. Ellis Morrison of Seattle on the subject of the Klondike gold fields in which he states that the gold brought to the United States from the Klondike, already amounts to $9,000,000.

The editor of the "E. and M. Journal" is "disposed to think" that the Seattle man has "largely overestimated" the amount of gold. This is a mild way to put it. Mr. Ellis Morrison is an unadulterated liar.

The Sacramento Trustees have postponed the matter of a municipal electric lighting plant until next month in order to gather more data. It would seem as though with two electric transmission lines running into Sacramento, rates could be made satisfactory without forcing the doubtful experiment of a municipal plant.

STATIC SPARKS.

"Mr. F. W. Hawley of New York, the electrical engineer identified with the construction of the Niagara Falls power plant is on his way to this city. His purpose here, it is said, is to make an estimate for Mr. Huntington of the cost of changing the ferry steam railroad lines into electric roads. Mr. Huntington has asked Mr. Hawley to make a report on the difference in cost of operating electric lines from the Oakland mole to Berkeley, Oakland, Fruitvale and Alameda as compared with the existing broad-gauge system. The scheme contemplates the use of the present tracks and many of the coaches. Recently Mr. Huntington has had reports made to him concerning the use of electricity in handling suburban trains on several large Eastern railroads."—San Francisco Daily Papers.

The last time the shy and retiring Mr. Hawley was in San Francisco he succeeded in getting himself written up in the various daily papers by stating that he was suffering from a severe strain, due to overwork at Niagara Falls.

By some coincidence there was a parade taking place when Mr. Hawley reached this city, and the great engineer was so overjoyed at his welcome that on his return to New York he sent type written interviews with himself to the different papers, stating that the people of San Francisco had celebrated his arrival.

We notice that he is timing his second visit so as to be here at the same date on which the artillery at the Presidio will begin practicing with the big guns, so that on his return to the East he can announce that United States government ordered the twelve-inch guns fired in honor of his presence.

Mr. Hawley was not one of the electrical engineers of the Niagara Falls power plant, although he may have been employed there in some capacity. Neither have we been able to find any record of his having had any important work in connection with electric railroads. "Electricity" recently said of him: "When Mr. Hawley talks, people take to the woods."

We notice in a recent number of the "Electrical Review" that the Hatch "pottery" accumulator has been revised in Boston and has a corporation that guarantees the work of the battery and makes the usual claim of high efficiency, light weight, durability and compactness. It was some four or five years ago that the Hatch "pottery" battery was being worked in this city, but the stockholders of the company that did the experimenting have not yet got over the aching void that afflicted their pockets.

The new Boston company now call it the "Improved Hatch Accumulator"—it may have been "improved"—there was certainly room for improvement, but we do not grudge Boston the honor as well as the expense involved in any experimenting with the Hatch battery.

Our old friend, Col. Hartzell, the promoter of the San Mateo road, seems to be making things warm in Chico with his proposed Butte County Electric Light & Power Co.

The Gas Company is making frantic efforts to head him off, and at last accounts was so badly scared that it was preparing to light the streets of Chico for nothing.

The "Examiner" a few days ago published as an item of news the followeing statement:

"The Santa Rosa and Sonoma Electric R. R. Co., will build 70 miles of Electric R. R., in Sonoma Co. The line will start on Embercardero Ave., and will run by way of Sonoma, Santa Rosa, etc., to Calistoga. The line will cost about $10,000 per mile."

The astonishing part of this item is the statement that "the line will start." We knew that Col. Stone, "the natural born railroad builder," had the matter in hand, but we had no idea that the line would ever start, at least under its present management.

Our esteemed contemporary, the "Electrical Engineer," appears to be fair game for any old joke that comes along.

The latest thing that has appeared in its columns in this line is a description and cut of an air ship that is to work on the exploded idea that a vacuum is the proper caper to give an air ship buoyancy. Our contemporary mentions casually that the air ship will carry in its car "engines, dynamos,, electric motors, propellers, etc."

A few engines, dynamos, etc., more or less will of course make little difference in the success of such a scheme. It is interesting to note that the description of this air ship in the columns of a technical journal shows all the earmarks of the rank and palpable jokes that are usually read of only in the daily papers.

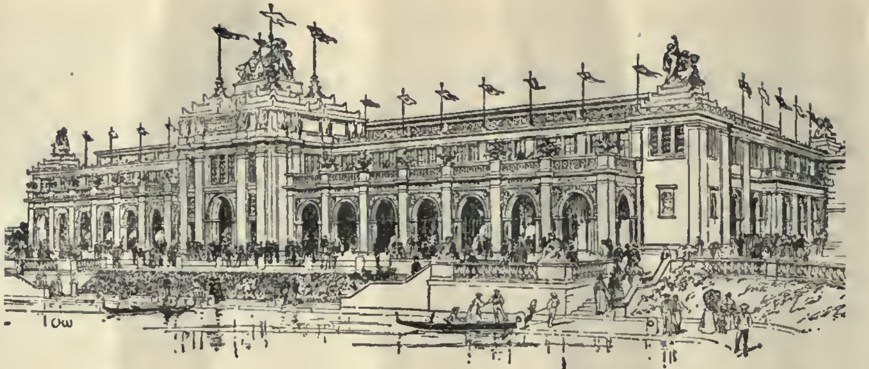
John Jacob Astor, having been induced to become an angel for the promotion of one of the numerous no-account storage batteries that the electro-delusionists are constantly trying to spring on the public, has now lost faith in storage batteries in general. John Jacob Astor is evidently "a good thing" and we advise some of our noble army of wave motor men to go to New York and tackle him. If General (?) Hart and Col. Kowalsky could have got him interested in their Fargo battery there would have been hot times in the old town, and we fancy that John Jacob Astor would have lost more than his faith.

An exchange says that an election is to be held at San Leandro, Cal., for the purpose of voting bonds for the construction of an electric light plant. The Trustees of San Leandro have been considering this matter at intervals of two weeks for a number of years past. If they keep up their rate of progress they may get an electric light plant some time during the next century.

Laird & Lee of Chicago have published a work of 497 pages by one D. B. Dixon, entitled "The Mechanical Arts Simplified."

In the electrical department the author introduces some original work of his own. Thus he has prepared a table of incandescent lamps showing the current consumption of different lamps, those of candle-powers from 10 to 50 and voltages from 52 to 2000. The 2000-volt 16-cp lamp takes .0288 ampere!

Or again when he says: "All machines that are used for lighting generate a simple two-phase current, which means that the current rapidly oscillates or changes direction."



MACHINERY AND ELECTRIC BUILDING OF TRANS-MISSISSIPI EXPOSITION.

TRANS-MISSISSIPPI AND INTERNATIONAL EXPOSITION.

We show illustration of the machinery and electric building of the Trans-Mississippi Exposition that is to open in Omaha in November, 1898.

The Machinery and Electricity building is located in the north-east corner of the Grand Court, being east of the Mines building and across the lagoon from the Manufacturers building. The design is governed by the general conditions requiring harmony with the other buildings; the architecture of the group is modern Renaissance.

The building is 304 feet front by 144 feet in depth. There are triple entrances on the main floor level in the center of the main front, and similar groups in the centers of the east and west fronts, with four emergency exits in the north wall. In front of the building, flanking both sides of the main entrance, is an open portico sixteen feet wide, running the entire front of the building. The center entrance feature projects beyond the portico, thus forming the grand entrance vestibule. The main floor covers the entire area of the building. Above is a gallery thirty-two feet in width, extending around the four outer walls. The gallery is reached by spacious staircases located in the front corners of the building. In the rear corners are commodious toilet rooms. This leaves a high central court 248 feet long by 80 feet wide, lighted from the sky-lights and clere-story windows above the roof.

The character of the exhibits sheltered by this building is shown by the decoration. The ornamental spandrels and panels receive all of their motifs and suggestions from machinery. The cresting at the top is composed of cog-wheels, this principle being carried out in all of the decorations. The enderlying principle and function of machinery is symbolized by the groups of statuary on the top of the building. At each of the four corners are groups representing the early supremacy of man over the untamed forces of nature. These forces are represented by wild animals. Men in their youth are seen subduing them for the simple purpose of escaping injury and the preservation of their own lives at the sacrifice of the natural forces. A higher supremacy is shown by the center group, which is the dominating feature of the entire design. In this, man developed beyond the youthful stage, having wisdom, takes these same untamed, unharnessed forces of nature and harnessess them to his chariot, making them do his bidding, symbolizing in a direct way the service which machinery does for man in using the powers of steam, fire, electricity and gravity.

Color enters in to the design with maximum importance. The ornaments in the panels under the porticos and over the main entrances will be highly emphasized by small background spaces of strong colors. These are treated in such a way as to give great interest to the spectator near by without detracting from the general quiet and dignity of the view from a distance. The entire building will be a series of yellow and ivory tones, growing more intense as they reach the top, culminating in the dull golden statuary full of primitive vigor which surmounts the building and symbolizes its use. The building was designed by Dwight H. Perkins, architect, Chicago.

RELATIVE COST OF IRON AND COPPER FOR CONDUCTING ELECTRICITY.

The question is frequently asked, since the use of an iron conductor has been found advisable in the B. & O. tunnel, and on surface or elevated roads using the "third rail" system, as to the relative economy of the use of copper conductors or iron.

The accompanying table, given by Mr. J. R. Allen in The Technic, shows the result cost of copper in cents per pound as compared with wrought iron, Bessemer steel and cast iron in dollars per ton. The comparison is made for conductors having equivalent carrying capacity. In using Bessemer steel rails for conductors it is possible to use those that are winding and imperfect. Such rails may be purchased at a greatly reduced price. Let us consider the saving that can be made by the use of Bessemer rails, assuming the rails to cost $25 per ton, as compared with copper at 11 cents per pound. Let the current to be transmitted be 1000 amperes at 500 volts, and the distance it is to be transmitted be three miles with 5 per cent. drop in voltage.

Cost of copper conductors	$39,000
Cost of Bessemer steel conductors	23,711
Difference	5,289
Deducting $400 per mile for bonding	1,200
Total saving	$ 4,089
Saving per mile	1,363

The first use of steel rails as conductors was on the intramural road at the World's Fair.

THE TACOMA MUNICIPAL PLANT.

At Tacoma, Wash., the special council committee appointed to investigate the conduct of the light plant has made its report to the council. The committee found the plant in a very uneconomical condition. The engines and boilers and auxiliary apparatus were old-fashioned and uneconomical. It will cost about $40,000 to reconstruct the plant, so that it can be economically operated. In the month of May the committee states electricity produced at the city plants cost 2.76 cents per k. w. hour, or a total for the month of $1.752. The same amount of electricity at the rate paid for current now purchased under contract would have cost the city $952. Or, in other words, if the city had purchased its electricity at the rate paid for the day load it would have saved in May $800. This would amount to a saving of $9,600 a year.

SAFETY EXPLOSIVE PROPERTIES OF ACETYLENE.

If 3 per cent. of acetylene be mixed with air, an explosive mixture is produced. In the case of hydrogen 5 per cent. is required, and for coal gas 8 per cent. The maximum amount of acetylene that can be mixed with air to form an explosive mixture is 82 per cent., and the corresponding figure for hydrogen is 72 per cent.

It, therefore, appears that acetylene is more explosive than either hydrogen or coal gas. As the burners used for acetylene would discharge a less amount of gas—say one-fifth that of an ordinary gas burner—the accidental opening of a burner would cause the atmosphere of the room, as a whole, to be much less contaminated in a given time than with coal gas. On the other hand, acetylene gas is so much more nearly of the density of air than ordinary illuminating gas, that it will not be diffused as rapidly through the air in case of leakage, and will have a greater tendency to collect in a partly enclosed space, and thus cause an explosion in case the gas were ignited.

(Experiments were made in which acetylene and ordinary illuminating gas were exploded when mingled with air. The gas was allowed to escape from a burner into a tube placed at an angle. The explosion produced by the acetylene was much more severe than that produced by the illuminating gas.)

In regard to the explosive properties of acetylene itself, much may be said. When carbon and hydrogen unite to form the compound called acetylene, heat is absorbed. According to Berthelot, if gaseous acetylene, under a pressure of about 15 pounds above the atmosphere, or over, be ignited by a spark, or by a heated platinum wire, it will decompose explosively without the presence of air. The explosion becomes more violent as the initial pressure is increased. In exploding, the carbon and hydrogen are dissociated, and the heat absorbed in the original formation is set free. This heat, according to Berthelot, is sufficient to increase the temperature (provided the pressure be kept constant), about 5,000 degrees Fahrenheit, or to increase the pressure to eleven times the initial (if the volume be maintaned constant). At atmosphere pressure, however, Berthelot found that acetylene gas containing no air could not be exploded; for if a spark were generated in it, or even if fulminate were exploded in it, there would be no decomposition into the elements of carbon and hydrogen, except near the point where the spark, or fulminate, acted on the gas.

Berthelot also found that liquid acetylene, as transported in tanks under pressure, would explode as readily as the gas. In one case, he exploded liquid acetylene in an iron tank by means of fulminate of mercury, and shattered the tank to pieces. He also made experiments to determine if blows or shocks would start explosions in cylinders of the liquid. He found that a shock would not of itself start an explosion, but that when steel cylinders of the liquid acetylene were smashed the blow was usually followed by an explosion, probably produced by the sparks generated by the friction of the pieces of broken steel. He states that local elevation of temperature may produce compounds evolving heat, and finally cause an explosion; and also that the sudden opening of a stop-cock may produce local heating and an explosion.

The invetigations of Berthelot on the explosive properties of acetylene show how dangerous the gas is when stored under pressures higher than that of the atmosphere. That such is the case is borne out by the fact that a number of accidents have occurred where it has been used under such conditions.—Extract from Lecture of Prof. D. S. Jacobus, before the Franklin Institute.

DISCHARGE OF CATHODE RAYS.

A fundamental difference between cathode rays and X-rays has been considered to lie in their manner of discharging electrified bodies. Whereas the former only discharge positively electrified bodies, the latter discharge any electrification, of whatever sign. Batelli and Garbasso, in "Nuovo Cimento," prove that cathode rays acquire the discharging properties of X-rays and Lenard rays when "filtered" through a plate of aluminum or glass, but that the change in properties is not due to the passage, but to the change in the medium surrounding the rays. The proof is conclusive. A charged terminal is mounted in the wall of the vacuum tube. A shutter of aluminum or lead is made to slide over and cover it. The discharging phenomena are the same in kind with or without the shutter, though differing in intensity. The discharging properties of Lenard rays are therefore due, like those of X-rays, to the ionisation of the air.

AMERICAN RAILWAY APPARATUS FOR IRELAND AND SPAIN.

The British Thomson-Houston Company, of London, through its representative, Mr. A. K. Baylor, has just closed an important electric railway contract with the companies operating the tramway systems of Dublin, Ireland, and Barcelona and Madrid, Spain. The contract for Dublin includes all steam, as well as the electric generating and motor equipment, and comprises six Allis horizontal engines of 500 h. p. each, with Babcock & Wilcox boiler capacity necessary; 6,500 kilowatt multipolar General Electric generators for direct connection to the engines and complete switchboard and station equipment. The car equipment will consist of 150 complete motor and series parallel controller equipments, the motors to be mounted on Peckham trucks. This contract follows closely that made for the equipment of the Clontarf line of the Dublin tramway system, which will be opened within the next week or two. The apparatus for this was also supplied by the British Thomson-Houston Company.

The contract signed for the Barcelona and Madrid roads cover 5,400 kilowatt multipolar General Electric generators and three of seventy-five kilowatts each, all to be directly connected to the engine shaft. While the three latter will be lighting generators they will also be wound for 500 volts. This contract also includes full station equipment.

THE NEW MINING LAWS.

We are in receipt of the Directory of Mines for May, 1897, published by the "Mining Record," Limited Liability, P. O. drawer 57, Victoria, B. C.

The book contains the only complete synopsis of the mining laws of British Columbia yet published, with amendments passed at the late session of the Legislature, carefully compiled by Archer Martin, barrister-at-law, Victoria, B. C. In addition to the above, much useful information relating to the mines and mining generally is included in the May number, so that it is at present the most valuable work for mining men to be found in the market.

For sale at all bookstores. Single copies, fifty cents. Annual subscription price for the four quarterly issues, $1.50.

Parties wishing to know the state of the mining laws as they stand to-day should procure a copy of the work.

Los Angeles, Cal.—The wave motor which is being tried about 4 miles north of Redondo, seems to be doing good work so far as the production of electric lights is concerned.

A Mr. Blood has been erecting an "electro-peroxygen" plant in the wilds of Nevada.

NEWS NOTES

POWER.

Fresno.—The San Joaquin Electric Co. has purchased a 15 h. p. 200 volt G. E. motor.

Honolulu.—F. H. Wickman has purchased a 3 h. p. G. E. 110 volt motor.

Bakersfield, Cal.—The General Electric Co. has sold a 5 H. P. 110 volt motor to the Bakersfield Gas and Electric Co.

Portland, Or.—The Columbia Mining Company has purchased a 4 1-2 kw. generator from the General Electric Co.

Stockton, Cal.—The General Electric Co. has sold to H. L. West a 30 h. p. 500 volt motor and a 15 h. p. 500 volt motor.

Seattle, Wash.—The Union Electric Co. has purchased a 3 h. p. and two 1 3-4 h. p. 250 volt motors from the General Electric Co.

Tuscaroro, Nev.—The General Electric Co. has sold to the Dexter Gold Mining Co. a transmission plant consisting of a 100 kw. 3 phase generator and a 75 kw. symhronous motor with outfit complete.

Keswick, Cal.—The Mountain Copper Co. has purchased a 17½ kw. 200 volt generator from the General Electric Co.

Sacramento, Cal.—The General Electric Co. has sold a 15 General Electric motor.

Petaluma, Cal.—The General Electric Co. has sold a 5 h. p. 500 volt motor to the Petaluma Electric Light and Power Co.

Redlands, Cal.—The Redlands Electric Light & Power Co. has purchased a 10 h. p. General Electric 110 volt motor.

Salt Lake, Utah—The Lake Bonneville Sand & Power Co. intend to supply electric power for a number of the mines in the Tintic district.

Riverside, Cal.—M. L.Cloeman has purchased a twentv acre place on Arlington Heights and will probably put in an electric power pumping plant for use in his place.

Victoria, B. C.—The British Columbia Electric Railroad Company is about to erect a power house at Gold stream, with Pelton water wheels as generators.

Redding, Cal.—Messrs. W. H. Hines, George Cook and Mr. Conant, will put in an electric plant and stamp mill at Coffee Creek, in the spring.

The Butte County Electric Light and Power Company: Oscar T. Weber, James Price, E. M. Weber, J. W. Hartzell and Richard White. The capital stock is $150,000, of which $2,300 has been subscribed.

San Bernardino, Cal.—A man named Taylor has filed a claim for 4,000 inches of Mill Creek for the development of electricity, compressed air or other power.

Winchester, Cal.—Wm. Newport, of Menefee, is preparing to sink three wells on his place. He is figuring on using electric power for pumping.

San Bernardino, Cal.—Rialto District voted to raise $8,000 to place an electric pumping plant on the Ferguson place.

Salt Lake, Utah—The Dexter Mining Company have made arrangements for the installation of an electric plant at Tuscarora. The General Electric Company, of Schenectady, N. Y., has received the contract for the 3-phase electrical power plant.

Nogales, Ariz.—The putting in of electrical machinery to run the cotton mill on San Miguel River at Los Angeles, in the Mermosillo district, is contemplated.

Winchester, Cal.—The board of directors of the Irrigation District are discussing the advisability of putting in another dam in the mountains on Strawberry Creek, to increase the flow of water and then to put in pumps with electric power.

Placerville, Cal.—It is reported that the new owners of the Griffith Consolidated, near Diamond, have under consideration the addition of a large electric plant to their proposed extensive improvements.

Riverside, Cal.—Professor C. G. Baldwin, in pursuance of his plan to transport electricity to Elsinore, has filed notice of water appropriation in Alder Creek. He claims 300 inches about two miles from Mill Creek.

Butte, Mont.—The old Amber mill, near York, will resume operation. The company will introduce electric power in both mine and mill. Power drills will be introduced into the mine and electricity will run crushing plant. A 10-stamp cyanide plant will be erected next summer.

Visalia, Cal.—John A. Pirtle, of Los Angeles, representing the Kaweah Power and Water Company, has filed an application with the Supervisors to erect poles and string wires for the transmission of electrical energy along the highways of the county.

Captain Nevells, of the Rawhide, says the scarcity of water will effect the output of the mines in Tuolumne County. By another season the electric plant designed to furnish power along the lode will be in operation and the mines will then not be so dependent on the water supply.

Bakersfield, Cal.—The Kern River Electrical Development Company is advertising for bids on a contract to do a piece of rock work a short distance below Kernville. The company is to generate electrical force to use in Los Angeles. It will not be many months before the plant is completed and in working order.

Los Angeles, Cal.—The Southern California Power Company, of Redlands, has let a contract for the construction of 11,000 feet of tunnel and two miles of flume and ditch work in Santa Ana canyon for the purpose of bringing in water power with which to develop electrical energy for use in this city, to J. A. Fairchild and E. W. Gilmore.

Salt Lake, Utah—The James Leffel Water Wheel Company has closed a contract with St. Paul capitalists for six Turbine water wheels of 1,000 horse power each for a $2,000,000 power plant, to be established near Butte, Mont., on the Big Horn River. The plant will furnish electricity to Butte for power and other purposes.

Salt Lake, Utah—Dr. J. C. Ross, a Chicago capitalist, has about completed arrangements to place the treasury stock of the Hazel-Bess Company with P. D. Armour, the pork packer and other capitalists, and if the deal is consummated an electric or compressed air plant will be installed on the ground.

The Hyrum and Wellsville Electric Light and Power Company, with principal place of business at Hyrum City; capital stock, $50,000. Directors: J. F. Wright, W. H. Maughn, J. Howel, et al. The power plant is located south of the city of Hyrum, on the Little Bear River. Bishop J. F. Wright is the chief promoter of the enterprise.

San Jose, Cal.—The San Jose Power Company has taken the first step in constructing a large electric plant, similar to that at Folsom, for the dissemination of power in San Jose and vicinity. It is claimed that the cost of the proposed plant will be about $300,000 and the capital necessary is ready to carry out the scheme. C. W. Quilty is president of the company.

Vancouver, B. C.—City Council—A number of citizens, and Experts Williams and Symons were present and gave their opinion on the erection of the smelting works. Mr. Symons stated that his company contemplated operating their works by electricity, and would spend at least $800,000 or possibly $1,000,000 in the erection of electrical works at North Vancouver. Their engineers were Bewick, Moreing & Co., of London.

Chico, Cal.—The Butte Creek Mining Company, owning the Big Butte quartz mine, near Nimshew, are making improvements. The company will flume about one mile, and by placing a strong dam at the lower end of the flume, lay bare the bed of this creek. They intend to put in an electric plant. If this is done a large power house will be built at the lower end of the ditch. W. S. King, of Minneapolis, is president of the company. The electric plant would supply power and light to Chico, and if the proper encouragement were offered to Piggs, Marysville and Gridley, a fall of 300 feet can be secured.

TELEPHONES.

Articles of incorporation of the Alaska Electric Exploration and Mining Company, have been filed by Confer Hallen, Charles P. Baumgardner, Charles V. Lodge, F. A. Berlin, C. G. Cleary, E. B. Hare and A. J. Rhodes. Capital stock, $1,000,000, San Francisco.

Blue Lake, Cal.—The Sunset Telephone & Telegraph Co. intend to push the line through to Eureka as soon as possible. It is completed now as far as Fort Bragg.

Austin, Nev.—A telephone line between Ely and Eureka is being built.

San Diego, Cal.—A. H. Beach contemulates building a telephone line to Escondido.

Berkeley, Cal.—Fourteen telephones were ordered for the college buildings at Berkeley.

Antioch, Cal.—A new telephone line is to be put up between Antioch and Brentwood. Work will soon be commenced. The line will in all probability be extended to Tracy.

Salt Lake, Utah—It is announced that the Postal Telegraph Cable Company will extend its lines to Salt Lake City in the near future. George G. Ward is general manager of the company.

Portland, Ore.—A new telephone line will be built from here to connect with Roller Mills on Long Creek. The Oregon Telephone Company is surveying route for telephone line from Munroe to some point between Harrisburg and Junction.

Caldwell, Idaho.—The telephone line from Weiser to Salubria, is to be extended to Warrens.

Bakersfield—A local company, headed by W. S. Tevis, has just incorporated the Electric Water Company with a capital stock of $300,000. Objects are to deal in water rights of all kinds and to supply Bakersfield and other Kern County towns.

Sierra Telegraph Co., capital stock, $12,400. Incorporators: T. S. Bullock, S. D. Freshman, S. D. Woods, G. A. Brown, Jr., R. L. Beardslee. The line is to be 124 miles long and will run from Modesto to Knights Ferry, La Grange and Coulterville.

Riverside, Cal.—The Riverside Water Company has found it necessary to change its old system ground circuit telephone running from Colton to Riverside to a metallic circuit. This will necessitate the wiring of nine miles of territory.

Eureka, Cal.—Superintendent Frank Bell, of the Sunset Telephone Company, is meeting with considerable encouragement in his canvass of the city in the matter of the proposed extension of the telephone system to connect Eureka with San Francisco.

Los Angeles, Cal.—Pasadena council. City electrician requested that forty-foot poles be erected on Orange Grove avenue, local telephone company to stand half the expense. Councilman Reynolds was appointed to investigate expense of placing wires under ground.

Olympia, Wash.—The Inland Telephone & Telegraph Co. is making extensions of its lines in all parts of the Palouse country.

Union, Ore.—The Union Telephone Company will extend its line from Telocaset by way of North Powder and Haines to Baker City and has let a contract for poles to J. E. Carroll, of North Powder. The Cornucopia extension will soon be completed.

Hoquaim, Wash.—Ordinance has been passed granting H. C. Harrmans right to construct, operate and maintain telegraph and telephone lines along certain streets in Hoquaim.

Victoria, B. C.—Notice is given that application will be made to Legislative Assembly, B. C., for an act to incorporate a company with power to construct and operate telegraph and telephone lines in Cassiar district. B. B. McPhillips, Wootten & Barnard, solicitors for applicants.

Virginia City, Montana—David L. Murray, of the Rocky Mountain Bell Telephone Company, is constructing a telephone line from Butte to Gaylord, from which place it will be extended to the head of the Gaylord ditch. It is the intention of the company to extend the line to Silver Star, Twin Bridges and Sheridan, and probably Dillon.

Honolulu, H. I.—The Hilo Telephone Company contemplate putting in a metallic circuit into operation in their Hilo system. This means a complete return wire for every patron. It is reported that $12,000 has been subscribed for the establishment of a company to put in a new telephone line at Kohala, with headquarters at Hilo.

Yreka, Cal.—J. G. Cunningham, superintendent of the Sunset Telephone Company, has made arrangements to extend the line south to Fort Jones, Etna and way points, and north to Ashland and vicinity. This line when completed, will form part of the main line between San Francisco and Portland. It is the intention of the Sunset Company to build lines in all directions from Yreka at an early date.

Albuquerque, N. M.—Some time ago a movement was started looking to the securing of an electric fire alarm system for Albuquerque. The total cost was found to be $750. The plan is to place an electric battery and connect it with nine electric fire alarm stations—two in each ward and one in the center of the city. Chief B. Ruppe, of the fire department, states that the majority of the people are in favor of the installation of this system.

RAILROADS.

Riverside, Cal.—The city gives the Riverside and Arlington Railway Company another years time in which to electricize its road under a contract, by which the city agreed to supply the necessary electricity.

Los Angeles, Cal.—The Pasadena and Los Angeles Electric Railroad have petitioned the board of trustees for right of way to build a railroad from the South Fair Oaks track along Dayton street to the rear of the Doty block.

San Bernardino.—The Pacific Borax Company asked permission to run a railroad across the county bridge at Daggett to be operated either by steam, electricity or horse-power. Referred to Superintendent West, with power to act.

Red Bluff, Cal.—The company which has bonded the Kestner & Thompson mining property in the west of Tehama County, will commence operations next week. An electric railway to Red Bluff is one of the possibilities if the mine is a success.

Salinas, Cal.—Notice is given that the Salinas Railway Company has applied to the Supervisors for a franchise to construct and operate a railroad in Monterey County, to be operated by means of electricity or any way they desire. Bids for said franchise will be received up to 10 a. m., October 9th. J. W. Irvine, Clerk.

Vancouver, B. C.—Notice is given that application will be made to the Legislative Assembly, B. C., at the next session, to incorporate a company with power to construct, equip and maintain a railroad, commencing at a point at the south end of Teslin Lake and running to the north boundary of the Province of British Columbia; and also for further power to build, construct, equip and maintain telegraph and telephone lines in connection therewith.

The directors of the Market-street Railway Company are to meet this week to pass upon the proposition of building an electric railroad to the Cliff House along the southern limits of Golden Gate Park. At present the company operates a steam dummy road south of the Park to the Cliff House. The steam road is a broadgauge line. The expense of converting it into an electric road will, it is thought, not exceed $75,000.

All of the directors are said to be in favor of the improvement, but some want the matter deferred until the summer of 1898, and at that time have the steam road north of the Park to the Cliff House also converted into an electric line.

Several of the directors when seen admitted that both of the roads leading to the Cliff House would eventually be turned into electric lines. They said that the road north of the Park when changed into an electric line would be continued as such as far east as Fillmore street from the corner of Central avenue and California street, up the former one block to Sacramento and east on the latter to Fillmore. By that arrangement the line north of the Park would receive its electric power from the Fillmore-street electric road. The running of electric cars on Sacramento street, between Fillmore and Central avenue, will in no way interfere with the Sacramento cable cars running to the Park.

To convert both steam roads into electric lines will not cost, it is claimed, $200,000. Some of the directors favor making the change immediately, because it can be done without resorting to the sale of any more bonds.

During the past week the company paid $32,600 in dividends, or a quarterly dividend of 20 cents per share.—Examiner.

LIGHTING

Arlington, Ore.—R. H. Robinson will put in an electric light plant soon.

Hamet, Cal.—Charles Chambers has been granted a franchise to supply the city with electric lights.

Nelson, B. C.—It was resolved to ask the Nelson Electric Light Company to submit a proposition for lighting the streets in the city.

San Luis Obispo, Cal.—The council has voted to have the city lighted with electricity.

Santa Ana, Cal.—Joseph Yoch is figuring on an incandescent light plant for his hotel at Laguna Beach.

Mount Vernon, Wash.—B. E. Brand, of Whatton, states that a move is on foot to put an electric plant in here.

Tucson, Ariz.—The Trustees are discussing the advisability of putting in another engine for their electric light system.

Auburn, Cal.—A new enterprise is under way at Forest Hill, known at present as the Forest Hill Electric Co. The proprietors are E. R. Wilson and C. W. Langstaff. Plant includes a power house 2 stories high, 26x40 feet, to accommodate an automatic engine of 40 h. p. Operations will begin in about six weeks.

Sacramento, Cal.—Trustees—Matter of ordinance calling a special election to decide on the construction of a municipal electric lighting plant was taken up. It was suggested that before the ordinance is passed an estimate of the cost be made. Matter was postponed for four weeks. McKay said experts told him it would be put in for $200,000.

Red Bluff, Cal.—The Bend Colony Irrigation Co., to supply water to the colonists of Bend Colony. The Co. has power to construct an electric light plant on the premises if they so desire. Incorporators, Dr. A. M. F. McCullough, W. C. Brokaw, J. Muller, J. B. Rogers, et al.

Nelson, B. C., Miner.—Mr. Archer of the Kootenai Water Supply Co., says that the Pend D'Oreille plant could be turned into an electric power and lighting plant for the purpose of supplying Rossland with light.

Honcut, Cal.—It is proposed to establish an electric power plant here.

Chico, Cal.—A meeting will be called of the Butte County Electric Light and Power Co. in San Francisco preparatory to commencing active work upon their power plant in Chico.

Kelso, B. C.—John McHarris is preparing to enlarge the Sandon electric lighting plant.

Oakdale, Cal.—Mr. Boyd and Assistant Kneely are thinking of erecting an electric plant.

Pacific Grove, Cal.—Professor J. K. Oliver has in view an electric light plant to furnish light for Sali, Monterey and Pacific Grove.

Helena, Mont.—The Helena Water and Electric Power Company was granted a twenty year franchise, which will take effect when the new company complies with its conditions.

Redondo, Cal.—The Redondo Hotel will soon be lighted by an individual electric plant, instead of by the city system, as at present.

Sonoma, Cal.—The electric light plant will soon be in operation. The cost of machinery, etc., was discussed at a meeting of the stockholders on Wednesday. Julius Forchetti is the promoter of the scheme.

Redding. Cal.—J. E. Terry, owner of the Shasta Lumber Company, is making arrangements to put in an electric light plant. The dynamo will be run by water power.

Colton, Cal.—On motion of Franklin, the agreement dated September 13th, between the city and W. H. Porter, for the construction of an electric line and furnishing electric lights, was approved.

San Luis Obispo, Cal.—Henderson, Whissel and Saw were appointed a committee to investigate the matter of street lighting and report.

Chehalis, Wash.—One of the dynamos burned out of the electric light plant, and the one dynamo that will run will not carry the incandescent lamps and the commercial arc lamps. The plant will probably be leased to some party soon who will invest in an engine to run the plant.

Riverside, Cal.—Trustees—The contract for 50,000 electric light carbons was awarded to Hugo Reisinger of New York. The superintendent of the electric lighting system was instructed to complete the extension of the electric light line down Magnolia Ave., to the Arlington M. E. Church.

Grand Forks, B. C.—Council has awarded contract for water works system and an electric light plant complete, to contractor Davies, for $13,974. The electric light plant will have a 120-h. p. engine. The plant is to have 1,000 incandescent lights and 5 arc lights, so arranged as to light the entire city. Plants to be in running order by Jan. 15th.

Asotin, Wash.— C. C. Burnell and B. F. Morris of Lewiston, Ida., filed water right on part of the Asotin Creek. Purpose, to erect a power plant to generate electricity for electric light plant in Asotin and Lewiston.

Reno, Nev.—At the election it was decided to issue bonds to the amount of $150,000 for the erection of an electric light plant and city water works. It is understood that the old Co., will contest the issuance of the bonds, questioning the act authorizing the calling of the election.

Ogden, Utah.—D. B. Dyer has been granted right to erect wires, poles, etc., for purpose of conveying electricity for lighting and heating and other purposes.

Logan.—The Logan Power, Light & Heating Co., is making arrangements to replace their present plant with new and improved machinery, which will greatly increase their capacity for lighting and power. It is probable that C. D. W. Fullmer will be business manager.

San Pedro, Cal.—It is reported that the electric light plant is to be moved from San Pedro to Long Beach. In this case it would be a good thing for San Pedro to vote bonds for the establishment of an electric lighting plant of its own.

Mokelumne Hill, Cal.—Mr. Brandt, who has charge of the electric light system in town, has been making an effort to have the citizens subscribe enough to put in 20 street lights. The Electric Co., offers to put up twenty 16-candle power lamps for $30 per month.

Sacramento, Cal.—Report of Committee on Public Improvements on the purchase and operation of a municipal electric lighting plant was received and placed on file. Report showed estimated cost of 250 arc light steam plant, with pole line, to be $63,658.

Eureka, Cal.—Swortzel & Williams, owners of the electric light plant at Fortuna, were granted privilege of erecting poles, stringing wires, etc., along county road from Fortuna to Newberg for the purpose to supply electric light to houses in Newberg and along the road.

San Diego, Cal.—Board of Delegates—A resolution by Johnson directing the city engineer to draw up plans and estimates of cost for a city electric lighting plant, to be operated either by water or steam, was referred to the Electric Light Committee.

Hollister, Cal.—The Hollister Light and Power Co., submitted a contract to the city Trustees for furnishing light to the town for two years, which was read and approved. The Co., agrees to furnish the town with 20 arc lamps, 1,200 candle-power each, lamps to be lit at twilight and burn till midnight; also five gas jets to be lit at 12 o'clock, midnight, and burn till dawn. The town agrees to pay $200 per month.

Nevada, Cal.—Sealed bids will be received by the undersigned until 8 p. m., Oct. 21st, for contracting to light the streets of Nevada City and City Hall. There will be 60 or more 24-candle power all-night lights to be located at or about the places where the city electric lights now are, or such other places as the Board of City Trustees may from time to time select. All lights to be put in place without expense to the city. T. H. Carr, Clerk.

Los Angeles, Cal.—Sealed proposals will be received by the undersigned until 11 a. m., Oct. 18th, to light the streets of the city of Los Angeles with electricity for a period of one year from and after Jan. 1st, 1898. Specifications on file at the office of the undersigned. A certified check in the sum of $5,000 must accompany each proposal. Council reserves the right to reject any or all bids.

Napa, Cal.—Sealed proposals will be received by undersigned up to 7:30 p. m., Oct. 18th, for lighting streets of Napa for a period of six months from Nov. 1, 1897 to May 1, 1898. Bids to state price per light per month. Bids also to state candle power of lights proposed to be furnished and whether proposed lights are gas or electric and if electric, must state price for incandescent and arc lights separately. Right reserved to reject any or all bids. H. H. Thompson, City Clerk.

Redwood City, Cal.—Supervisors—An ordinance has been passed granting to San Mateo Electric Light Co., right to erect and maintain works, poles, etc., for making transmission and distribution of electricity and gas in San Mateo Co. An ordinance has been passed granting the Peninsula Lighting Co., the same privilege as the San Mateo Electric Light Co.

Chico, Cal.—Trustees—A petition signed by O. T. Weber, J. Price, E. M. Weber, et. al., directors of the Butte Co., Electric Light & Power Co., was received requesting Trustees to grant them permission to erect poles, etc., for purpose of conveying electric light and power along the streets of the city. A resolution to that effect was introduced by O. L. Clark, and referred to City Attorney.

Hanford, Cal.—Supervisors—Board passed ordinance granting to H. G. Lacey & Co., a franchise for 50 years, to erect and maintain poles and conduct electricity along or under the streets and roads of Kings county. Lacey & Co., are allowed one year to complete a line for the delivery of power to the city of Hanford, or within such extension as may be allowed by the Board.

Marysville, Cal. Democrat.—Three propositions are being considered to the establishment of an electric light and power plant, the water power of each of them to be taken from the Yuba river. A company has been incorporated composed of Sacramento capitalists. These men have secured a water right, the location of which is ten miles east of the city. The second company, composed of residents of this city and county, have a franchise at the narrows, Smartsville, 18 miles East of Marysville. The third proposition is the Brown's Valley irrigation ditch which takes water from the Yuba river, 40 miles from this city. The first two propositions are considered the most feasible and advantageous.

Stockton, Cal.—Sealed bids will be received by the undersigned up to 7:30 p. m., Oct. 28th, for furnishing material and labor for an electric lighting plant to be installed in the Stockton Free Public Library. Plans and specifications to accompany each proposal, also certified check for 10 per cent of bid. Board reserves the right to reject any or all bids.

Vancouver, B. C.—At a meeting of the Light Committee it was decided to place additional lights throughout the city.

W. C. Cutler, S. M. Bickford and Chas. W. Crosse of the Pioneer Gold Mining Company, will make a visit to Placer County for the purpose of looking over the property preparatory to making improvements, which will include an electric power plant . Power carried from the American River, two miles distant.

Monterey, Cal.—The Monterey Electric Light and Development Company entertain a proposition to sell the plant now in operation, and will put in a new and much larger plant. The power house will probably be moved to Monterey from Pacific Grove.—New Era.

San Francisco.—Lieut. Hughes, the naval officer in charge of the Branch Hydrographic Office at this port, has asked the Western Union Telegraph Company to supply the electrical appliances and connections for operating the proposed new time ball on the top of the new ferry depot tower. The Navy department consented to the removal, provided that none of the expenses were to be charged to that department.

Northern Light and Power Co., incorporated. Prin. place of business San Francisco. Capital stock $100,000—Directors: V. J. Rey, E. I. Parsons, Ed. Fish, et al. Alameda County Light, Fuel and Power Co. Principal place of business San Francisco. Capital stock, $1,000,000. Directors: W. A. Clark, E. S. Irwin, F. H. Busby, et al.

Los Angeles, Cal.—The L. A. Eelectric Power Co. will build 13 miles of tunnel, and a canal will convey the water in steel pipes.

Los Angeles, Cal. Times, Oct. 10th.—San Bernardino—The Southern California Power Co. entered into a contract with Fairchild & Gilmore of Los Angeles for tunnelling, etc., which involves the expenditure of nearly $100,000. They intend to push the matter of developing water power.

Sonora, Cal.—Trustees Bray and Kahl were appointed a committee to wait on the Electric Power and Light Co. and see what arrangements could be made regarding a more continuous supply of light, than has been had heretofore.

Nevada City, Cal.—Directors Bickford, Cutler and Gose of Boston, directors of the Pioneer Gold Mine Co., are in California. They are getting surveys and estimates for an addition of twenty stamps and an electrical plant for their mine in Placer Co., Cal.

Winnemucca, Nev.—Austin is to be lighted with electricity.

Pasadena.—The amended ordinance granting the franchise to the electric road on Dayton St., was adopted.

Lewiston, Idaho.—Lewiston Light Co., is considering a scheme to increase the efficiency of its plant. Several directors of the Co., have inspected water power above head of irrigation ditch on Asotin creek and found that 1,000 h. p., could be secured at that point. J. A. Cranton of General Electric Co., of Portland, states that cost would be about 20,000.

San Diego, Cal.—Oceanside Colonization & Development Co., of Oceanside. Object, to develop water of the San Luis Rey river for power for electric lighting purposes, railroad power and anything to develop the San Luis Rey Valley. Capital stock, $300,000. Incorporators, J. L. Sharpe, E. S. Payne, B. Bassell, W. V. Nichols and W. W. Spencer.

Redwood City, Cal.—Geo. Plump, H. Beeger, J. Small and G. W. Fox, the committee appointed to report upon the feasability and probable cost of establishing a system of incandescent lights throughout the town presented a lengthy report. The committee found that the power used in conducting an arc light system was sufficient to run a new system; that by adding the proposed system to the old one it could be conducted at very little additional expense; that a complete system of incandescent lighting with a capacity of 1,000 lights distributed as desired, could be secured for less than $3,000. The report was accepted and action will be taken later on.

Redlands, Cal.—Sealed proposals were recently asked by the Board of Trustees of Redlands, San Bernardino Co., for furnishing the city with electric light for one year, in accordance with specifications on file in office of the City Clerk. Bids to specify the rate per month for arc lights of 2,000 candlepower, to be placed at points on the streets of the city, to be designated by the trustees as follows:

For 16 arc lights,
For 18 arc lights,
For 20 arc lights,

Also the rate for such number of incandescent lights as shall be required for the offices of the clerk and marshal, the city prison and Fire Co's. hall and the Board-room of the Trustees of the city.

Ritzville, Wash.—Preparations are now in progress for the establishment of an electric light plant in Ritzville, in the near future. Mr. Hodges, of Kent, Wash., present engineer in the Ritzville Roller Mill, is the chief advocate of the project.

Sitka, Alaska.—H. M. Burner, writes from San Francisco to E. Otis Smith that he has completed the deal to organize a company, to be known as the Sitka Mining and Development Company, to operate mine properties in the Sitka District, to build water works and erect an electric light plant in Sitka.

Rossland, B. C.—R. Jamieson, chief engineer of the West Kootenay Power & Light Co.'s plant in Kootenay River, says they expect to have power supplied to Rossland by December. Sir Charles Ross, is president of the company. It is estimated that they can furnish electrical power at half the cost of steam.

Another wave motor company has been formed in this city to exploit the McFarland wave motor. The capital stock is five millions of dollars, and if even a small per centage shall be paid in, the motor will be able to run for some time.

We understand that Mr. Robbins, the ex-missionary who ran a brief career as manager of an electrical supply company in Oakland, has started again in this city.

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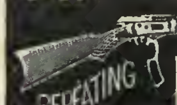

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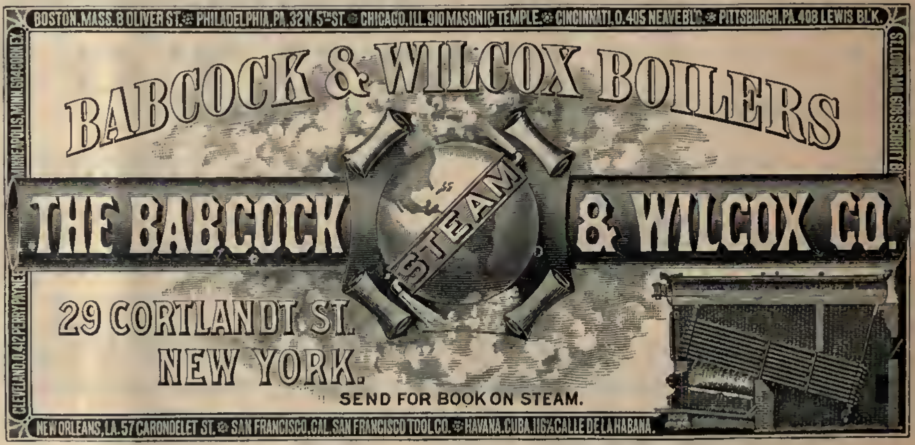

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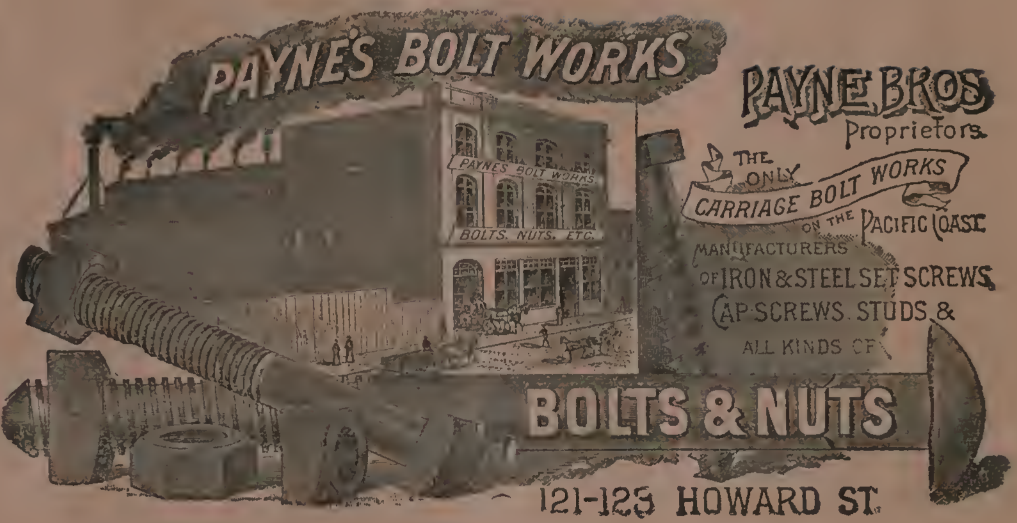
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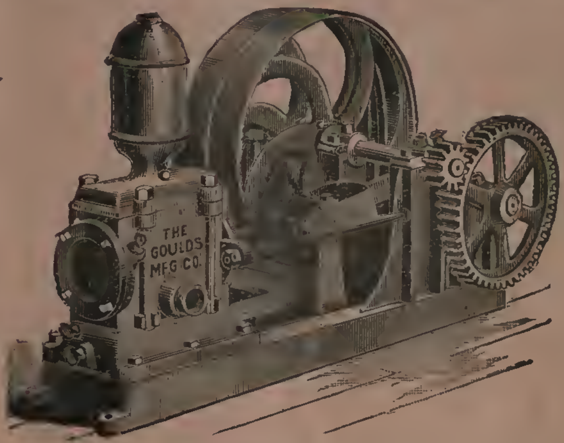
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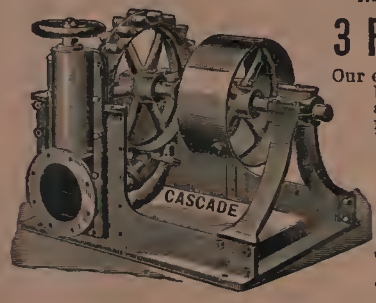

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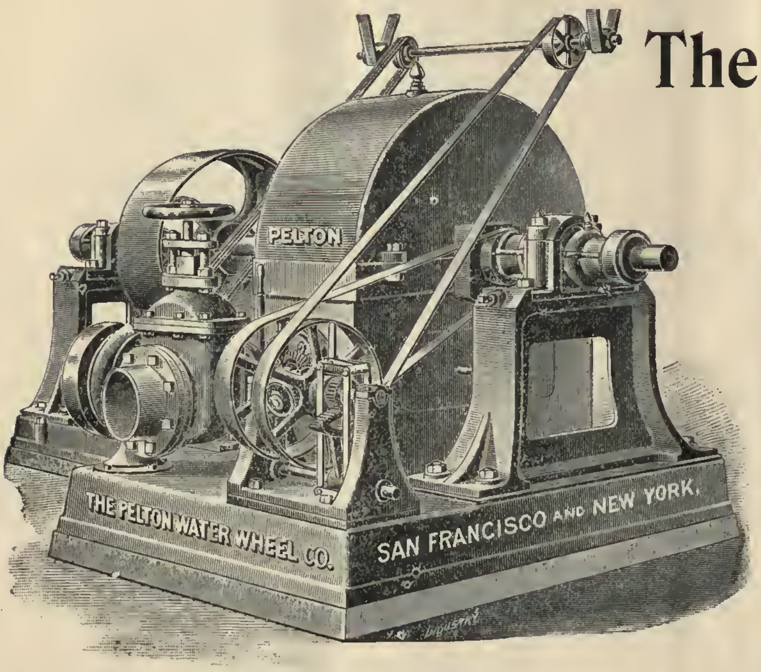
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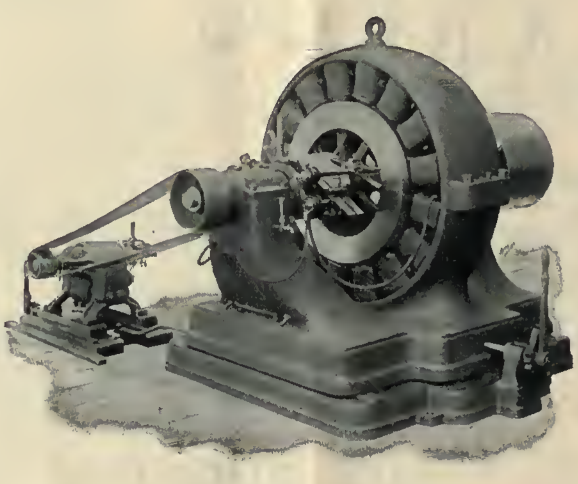

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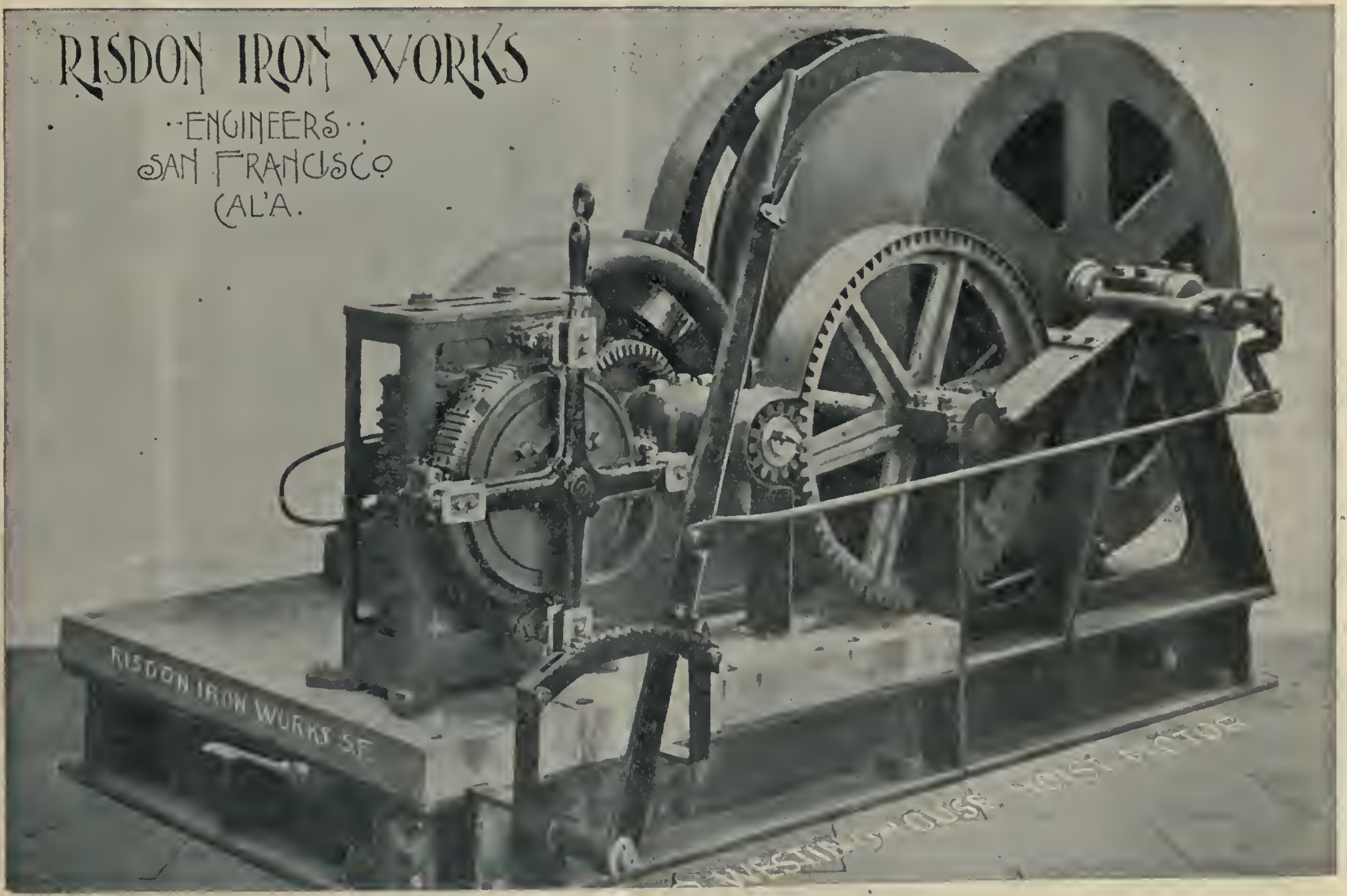
PACIFIC ELECTRICIAN

VOL. XVIII. NOVEMBER, 1897 No. 11

THE ELECTRIC HOISTS.

The cut shows two electric hoists recently shipped from the shops of the Risdon Iron Works in this city. The motors were built by the Westinghouse Company.

The motor is directly geared to the hoist drum by a rawhide pinion and double reduction gear through the friction clutch



SINGLE DRUM DIRECT CURRENT ELECTRIC HOIST.

The friction clutch is operated by the hand lever at the right of the cut. It connects the hoise drum with the motor gearing. A brake of the regular band and wheel type is operated by a lever under the operator's foot.

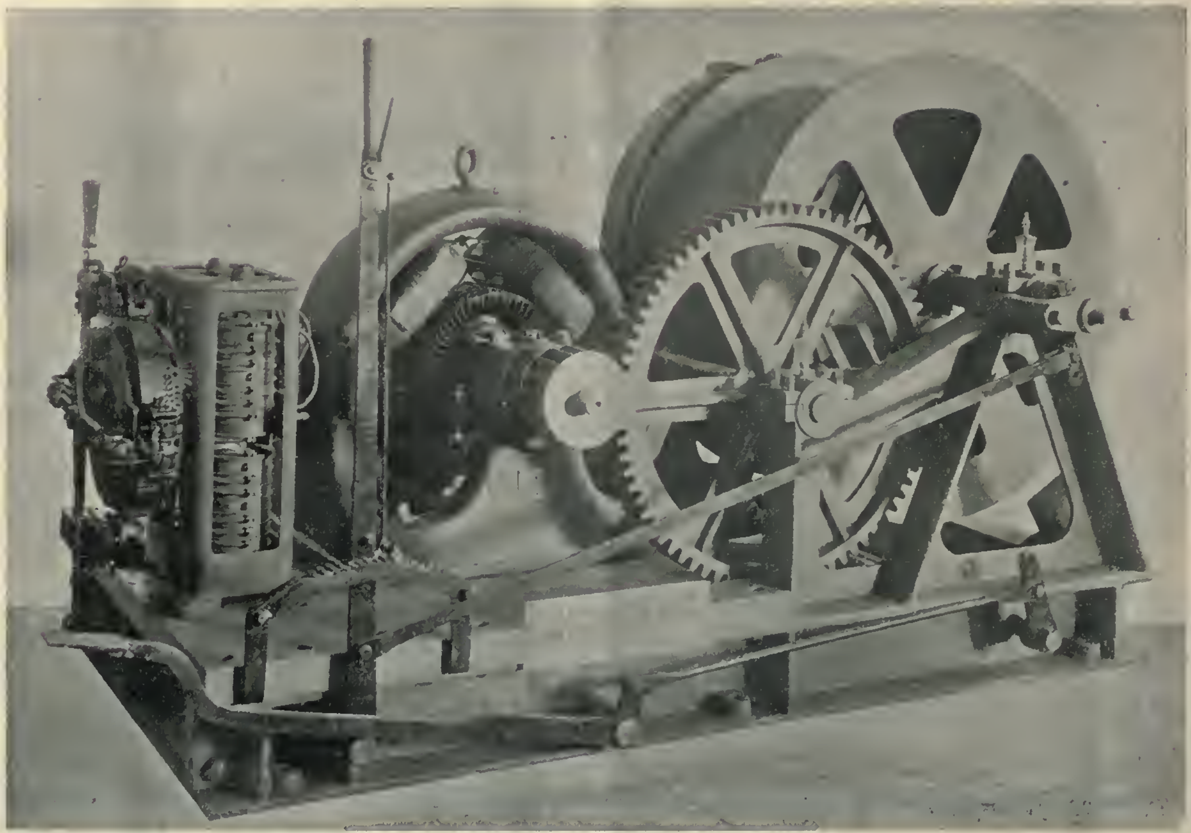
The motor operates in either direction. The speed and direction of rotation are easily controlled by the lever handle of the controller.

The motor is of the regular direct current type.

The controller is used to form the connections from the power line to the motor. A direct current motor cannot be connected immediately on to the main current, as the current would be prohibitory and the starting too sudden. A resistance is necessary therefore, to be connected between the main circuit and the motor, its object being to reduce the voltage on the armature of the motor to an amount proportional to the speed required. This resistance is gradually cut out as the speed of the motor increases. The power is off when the handle is in its vertical position, and the operation of starting in either directon is a slow movement forward or backward to such a point as gives the desired speed.

These motors are run in all locations, above ground or in mine drifts.

The Risdon Iron Works also build electric hoists, operated by Tesla Induction Motors. This motor is operated with the alternating current system, and is used in all cases where the distance is long or the required economy of power is important. These hoists are in every way similar to the regular



Single Drum Direct Current Electric Hoist.

mining hoists, except in the motor itself and in the controller

The motor is geared to the hoist in the usual manner employed for steam engines or water wheels.

The alternating current hoist has several decided advantages over the direct current hoist:

1st. The current can be transmitted from the power supply to the hoist at a high voltage and transformed to the working voltage by the regular static transformers, which require no attention.

2nd. The motor has no brushes or commutator, or collector rings, the only wearing part being the self-oiling bearings.

3rd. The rotating part of the motor is composed of a laminated iron ring mounted on a cast steel spider with a short circuit squirrel cage winding. It being permanently and purposely short circuited, there is no danger of injury to the rotating part of the motor, by short circuit from dampness or mechanical injury, and no ordinary amount of dust can effect the operation of the motor.

4th. With alternating current the conversion from one voltage to any desired voltage is so simple that the operation of a variable speed motor can be accomplished without the resistance needed for direct current work.

This is done by a series of conversions of different ratio and the proper switching device. All of the power taken from the line is thus used to operate the motor and not dissipated in resistance as is the case with a direct current motor. The voltage applied to the motor and the speed of it are controlled at will by the position of the lever in the hands of the operator.

5th. The motor can be used in a reversed position as a brake, when it will operate as a generator and supply current to the main line. The motor will do this with no more wear and tear than is obtained when running as a motor.

6th. The power taken from the line in the direct current hoist is proportional to the torque-lifting stress, and independent of the speed of the skip, the power going into the resistance, if the speed is low. With the alternating current hoist the power taken from the line is proportional to the work done—lifting stress multiplied by the speed of the skip, and no power is lost in resistance.

The British Thomson Company of London, through its representative, Mr. A. K. Baylor, has just closed an important elctric contract with the companies operating the tramway systems of Dublin, Ireland, and Barcelona and Madrid, Spain. The contract for Dublin includes all steam, as well as the electric generating and motor equipment, and comprises six Allis horizontal engines of 500 h. p. each with Babcock & Wilcox boiler capacity necessary; six 500 kilowatt multipolar General Electric generators for direct connection to the engines and complete switchboard and station equipment. The car equipment will consist of 150 complete motor and series parallel controller equipments, the motors to be mounted on Peckham trucks. This contract follows closely that made for the equipment of the Clontanf line of the Dublin tramway system, which will be opened within the next week or two. The apparatus for this was also supplied by the British Thomson Houston Company.

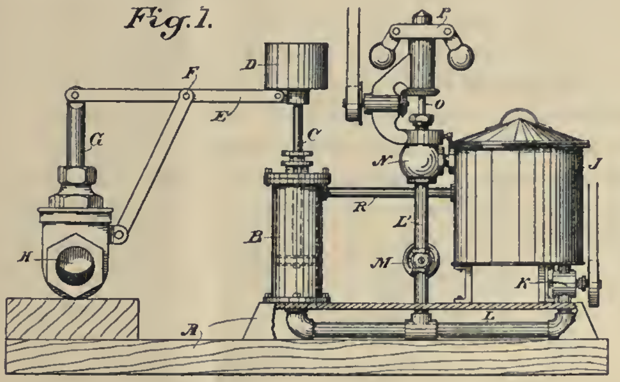
The contract signed for the Bareclona and Madrid roads cover five 400 kilowatt multipolar General Electric generators and three of 75 kilowatt each, all to be directly connected to the engine shaft. While the three latter will be lighting generators, they will also be wound for 500 volts. This contract also includes full station equipment.

The General Electric Company during the months of June, July and August received orders for 278 generators, aggregating nearly 14,000 kilowatts for lighting purposes alone.

TUTTHILL WATER WHEEL GOVERNOR.

The Tutthill water wheel governor, of which we show a cut, is of great interest to users of water power. This governor is the invention of Mr. S. J. Tutthill and is being manufactured by the Oakland Iron Works. The principal feature of this governor is its simplicity, combined with the vast amount of work it is capable of performing. Many experiments have been made during the past few years by inventors desiring to perfect a water wheel governor that could be depended upon for efficient and steady work. Mr. Tutthill had experimented with several electrical contrivances, but for practical use on water wheels it was found that those he tried were useless and they were discarded. This invention is a combination of several mechanical parts, as follows: 1st, rotary pressure pump; 2, centrifugal apparatus operating balance valve; 3, cylinder with weighted piston connected with a gate for turning the water off or on; 4, pipe leading from pump to bottom of cylinder, with bypass returning through balance valve to liquid tank.

Fig. 1.



TUTTHILL WATER WHEEL GOVERNOR.

A combination of all of these parts is secured, and when properly connected and set in motion, the pump supplies a positive pressure through the pipes, through the balance valve returning to the tank until a proper speed is obtained and a perfect balance is set-up, by the centrifugal part closing the balance valve, thus increasing the pressure of liquid in the cylinder until just the required amount of water is let on to the wheel to maintain the desired amount of speed. By the arrangement of pipes, one connecting the lower part of the tank with the pump and the other connecting with the upper part of the tank, constant circulation is effected. In this circulating pipe is a valve whereby the area of the discharge passage is increased or decreased; when decreased, a portion of the water is forced into the cylinder, thus actuating the wheel-controlling mechanism. A centrifugal part driven from the wheel shaft connecting with the valve in the circulating pipe increases or decreases the flow therein as the speed of the wheel varies.

A gate controlling the supply pipe is connected by a fulcrumed lever arm with the rising or falling weight and is opened or closed by its movements, thus increasing or decreasing the amount of water discharged upon the wheel.

The patent was issued on the Tutthill governor March 26th, 1897. Both the wheel and governor are Pacific Coast inventions.

The General Electric Company's San Francisco offices have been moved to the eleventh floor of the new Claus Spreckels building. The company's warehouse is now located on Townsend street, near Third.

BOOK REVIEW.

"Aluminum," edited by Alfred E. Hunt. The Pittsburg Reduction Co., Pittsburg, Pa.; 266 pp.; 4½x7 in. Cloth. Price, $1.50.

The author has gathered together a most complete digest of all the known facts in regard to aluminum, and added thereto a great deal of the experience gained by the Pittsburg Reduction Company in its manufacture and use. There are not only valuable tables of the physical properties of aluminum, but also information on the use of the metal for structural purposes, as an alloy with other metals, together with complete tables of weights of the metal in sheets, bars, etc. Also the electrical resistances of pure aluminum wire from No. 000 to No. 40 B. & S. guage—in short, everything that is thus far known of aluminum in its application in the arts. Added to the information on aluminum itself is a most excellent series of tables of gauges, weights and measures, and a variety of other information in daily use by electrical engineers. It constitutes a standard work of reference on aluminum.

"THE Entropy-Temperature Analaysis of Steam Engine Efficiencies," with Blank Diagram Arranged for Easy Application to Any Concrete Case. By S. A. Reeve M. E., New York. Progressive Age Publishing Co. 1897. 20 pp.; 6x9 in. Flexible Cover.

The application of the entropy method to the analysis of the operations going on in steam engine cylinders has but a comparatively recent origin, but the facts which this method of anlysis bring out are so well defined and graphically shown that it is getting to be a favorite method among intelligent engineers. The obstacles which have stood in the way of its general utilization by steam engineers appear to be due to its apparently involved nature. In reality, however, the method is quite simple, when thoroughly understood, while the results attained are greatly superior to those obtained by means of the usual discussion of the steam engine diagram alone. To facilitate the application of the entropy method to the analysis of steam engine efficiencies, the author has, in the present little volume, prepared a very concise practical essay on the subject. This is accompanied by a blank diagram arranged for easy application to any concrete case.

The Sunset Telephone and Telegraph Company has decided to close up the gap between its California and Oregon systems next summer. Direct conversations can then be carried on between San Diego, Cal., in Southern California and the British Columbia mining camps north of Spokane, Wash., also via the Puget Sound system to the British boundary. The territory that will be covered by the new line extends along and adjacent to the Southern Pacific Railroad Company's right of way between Redding, Cal., and Eugene, Or The distance is 425 miles. At present the longest direct communication possible on the California lines is about 1100 miles; on the Oregon-Washington lines about 1400 miles. The contract for the completion of the line between Redding and Eugene City has been awarded to Lewis & Burkholder, of Cottage Grove, Ore. The contract calls for 14,000 cedar poles, 9000 of which are to be sawed and 5000 round, all to be cut from live, green timber, and to be ready for delivery by April 1, 1898. The Sunset Company has inaugurated a novel news service in Santa Barbara County, Cal. The towns in the northern part of that county will be supplied every morning at 8:30, with a resume of the important news of the world, which will be posted in bulletins.

THE PACIFIC ELECTRICIAN.

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This paper is on file in every hotel of importance on the Pacific Coast, in Australia, British Columbia, Mexico and Central America.

Entered at the Postoffice in San Francisco as second-class matter.

Vol. XVIII. NOVEMBER, 1897. No. 11

THE SOUTHERN CALIFORNIA POWER COMPANY THAT WAS TO BE.

The proposed electric power transmission plant that was to have been constructed by the Southern California Power Company has died a-borning.

At the last moment, when the contracts for machinery, wire, poles and the entire outfit had been let, and a portion already delivered, it was found that the necessary money was not to be had and the whole thing has been declared off. The company was formed early in the present year by Mr. Sinclair of the Redlands plant and a Mr. Fisher of Pittsburg. It was announced that they had secured control of the Los Angeles and Pasadena Railway Co., the Pasadena Electric Light and Power Co., the Los Angeles and Santa Monica Railway Co. and the West Side Lighting Co. of Los Angeles, and were prepared to buy up and operate the entire electrical industry of the Southern end of the State. The big manufacturing companies accepted their contracts with eagerness and everything looked gay and prosperous. It was supposed that there was unlimited capital behind them—perhaps that was true, but at the present time it has evidently taken to its heels. While no one not on the inside can say exactly why the money was not forthcoming, there are a number of reasons plain to every one.

A seventy-three mile transmission plant operated at a voltage of 33,000 is believed by the manufacturing companies and by competent engineers to be a perfectly feasible proposition, but it was beyond question that such a transmission plant would encounter difficulties in meeting the new conditions ocnsequent upon such an undertaking that would necessarily render the operating expenses for the first year or two an uncertain quantity. No one could say what the limit would be, because a plant with such a large transmission line and such high voltage was never before attempted. In order to be able to meet these uncertainties and satisfy capitalists that their investment was safe, it was necessary that the market for the sale of power should be large enough to enable the plant to be operated well up to its full capacity and that the prices obtained should be high enough to produce a revenue to cover depreciation of plant, ordinary known operating expenses, unknown operating expenses, contingent on possible difficulties encountered and a fair rate of interest on the money invested.

There was no question about the market being large enough to take all the power that the company could deliver, but the only test that we have as to the prices that were to be obtained is that furnished by the contract that the company entered into with the Los Angeles Railway Co. According to that contract the Southern California Power Co. was to build a special pole line from the generating station to install a storage battery plant that would have cost not less than $100,000, and to put in a large amount of special machinery. The entire cost to the company to enable it to comply with the terms of its contract with the Los Angeles Railway Co., would have been in the neighborhood of $300,000. The amount of money that it would have received annually at the rate at which power was to be furnished would have just about covered ordinary operating expenses for the portion of its plant that furnished the power for the railway, depreciation on the plant and a very low interest on the $300,000 invested—any breakdown or unexpected trouble would have at once cut into the profits. The figuring on that contract was altogether too close and if its other contracts were taken on the same basis we are not surprised that capital was shy.

This is the rock on which promoters of power transmission schemes are too apt to come to grief. They know that the electrical transmission of power is a mechanical success and they assume that it will therefore necessarily be a commercial success. The most important thing about a transmission plant is the sale of the power.

That should be the starting point, and when it is settled satisfactorily, there will never be any trouble about the money needed or the machinery to be used. The collapse of the Southern California Power Company is a lesson in finance and one that other promoters would do well to bear in mind.

LOW COST OF POWER.

In a recent letter written to a friend in San Francisco, Mr. F. G. Lott, manager of the Buffalo and Niagara Falls Electric Light and Power Company, states that his company is making contracts in Buffalo for electric power at $16 and $21 per horse power per year, according to the amount required. This is far below any rates on the Pacific coast and is, we believe, the lowest rate made anywhere except at Niagara Falls itself. We confess we do not see how it can be done profitably.

......

The West Side Lighting Company of Los Angeles has changed its corporate name to the Edison Lighting Company of Los Angeles and the Los Angeles Record remarks the newly named company will now be equipped "with all the elctric lighting patents owned by Thomas Edison. Among them are included the Edison system of underground poles and wires." The use of underground poles will be an interesting departure from the usual practice, but since the new corporation has been equipped with a system of patents almost any old thing may be looked for.

STATIC SPARKS.

We are in receipt of the following communication from a subscriber in Red Bluff:

Red Buff, Nov. 13, 1897.

Editor Pacific Electrician,
San Francisco.

Dear Sir:—As you generally know all of the noted men and some that are not noted, except as failures, I write to inquire if you know anything about one F. Woldemar Ludovici of San Francisco. He has been here within the past few days claiming to have immense water privileges on Battle Creek in Shasta County, Cal., and proposed to furnish electric power to the combined north end of the State at a figure so low that any other mortal man, or soulless corporation now in existence, cannot possibly compete with. Do you know anything about the gentleman or his associates in this grand and awful enterprise. I should deem it a favor if you would answer my query.

Yours truly,

The first record that we have of the gentleman in question is that his name appeared in the San Francisco Directory for 1886. At that time, however, he was plain F. W. Ludovici.

The directories of the following years contain no mention of him until 1891, when he blossomed out as F. Woldemar. During 1891 and 1892 he was engaged in selling pianos, but the following year he again disappeared from directory notice and was gone for a series of years. In 1893 there was, however, a W. Ludovici, waiter at the Palace Hotel.

In 1896 we find F. Woldemar Ludovici—office, 9 Mills Building, but the gentleman is not there now.

It was in the fall of 1893 that F. Woldemar first attracted our attention as the organizer of the Pacific Bear Electric and Power Co. of Los Angeles. Capital stock, $1,000,000; $60,000 subscribed.

This company was, according to its prospectus, one of the most remarkable and wide-reaching corporations ever organized. It had a generator for making from oil and water a gas superior to any on the market and also a "self-contained gas steam boiler." Its most remarkable invention, however, was the "Bear dynamo." This dynamo used "two bunches of induced wire" and was more efficient than any other dynamo because "the independent force of magnetism was harnessed to help turn the armature forward as a generator."

In connection with this novel dynamo F. Woldemar's company was prepared to operate an electric railroad system that made each car "a self-contained power that can be run on any switch backwards or forwards." The car could also be "thrown from the track and run on the street, paved or otherwise," or it could go "around any obstruction on the track," by simply "placing upon the outer end of each truck a motor that will produce ten horse power."

Lastly, the company said "Our perfect system of insulation enables us to deliver the electrical energy shown at the dynamo any distance below fifty miles, without any appreciable loss."

Our correspondent will see from this that F. Woldemar Ludovici is a dangerous man when he gets his imagination going. Evidenty he has been biding his time, and now that the McKinley wave of prosperity has struck California, he has dug up the wonder-workingBear dynamo and will presently revolutionize the electrical field in the vicinity of Red Buff. Presently, when he has got things in shape, the inhabitants of the northern part of the State will see electric cars running about on the highways, jumping over fences, and climbing trees. When any one desires to ride, he will whistle and the car will come on the gallop.

As F. Woldemar can transmit eletrical energy without loss, he has a cinch upon the whole business, and other concerns had better get out of the way at once.

Why did not the Southern California Power Company call upon G. P. Low to rescue it with his great Finance and Construction Co?

We see that a local promoter of Klondike schemes advertises that he will deliver passengers and freight at Dawson with a train of sleds that are to be driven by electric power generated by the imagination of the promoter. The promoter must have been gazing on the wonders of the Tesla Electrical Exhibition and got his wits twisted.

Among the schemes that are engaging the attention of the people in the Klondike region is one reported from Seattle. Wash. James Hopkirk of Oakland, Cal., who is said to have superintended the construction of the Washington state building at the World's Fair, is negotiating with contractors for the erection of an electric elevated single-track railway from Skaguay over the White Pass. He said: "I have solved the problem of transporting passengers and freight from the coast to the lakes in the quickest, cheapest and safest manner by means of an electric elevated single-track railway, that can be built in 90 days at a cost well inside of $100,000, with a capacity only limited by the number of cars in use. The track consists of 12 by 12 inch posts, six feet high, 14 feet apart, on top of which are strung two timbers, each 6 by 12 inches, 28 feet long. On top of the timbers is a 30-pound steel rail on which the cars run.

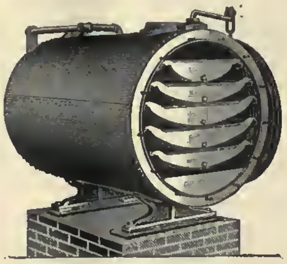
"The cars are 15 feet long, seven feet high and four feet wide, capable of carrying three tons each. Two cars are joined together by heavy beams and run one on either side of the rail, making practically one car. Two heavy car wheels support the load and two 15 horse power motors are needed, one for each wheel. The cars weigh 2,500 pounds each, exclusive of the motor, and can be built for less than $100 each. The bottoms of the cars run two feet above the ground. ......

"The cars are steadied by wheels at the bottom, set with a spiral spring which takes off the oscillation. The cars can turn on a radius of 50 feet and with a 15 horse power motor can climb a 17 per cent grade. Two trips a day can easily be made and a double car carries six tons.

"I am now negotiating with a syndicate to construct a road over the Skaguay trail, and expect to get well under way inside of three months."—Electrical World. Bosh!

THE HOPPES LIVE STEAM FEED-WATER PURIFIER.

The cut shows an end view of a steam feed-water purifier, that is being introduced on this coast at many of the electric plants and is meeting with great success.



HOPPES LIVE STEAM FEED-WATER PURIFIER.

The designer of the Hoppes Live Steam Feed-Water Purifier and Exhaust Steam Feed-Water Heater took from nature the principle on which the operation of these machines is mainly based.

Observing the formation of stalactites in natural caves, he conceived the idea of applying the same principle in a machine for the purification of water for boiler purposes.

Many methods suggested themselves, but the trough-shaped steel pans were adopted as being the simplest and most efficient. The pans are so formed that the water runs over their edges and flows in a thin film along their undersides to the center before dropping into the pans below.

As the steam enclosed in the shell comes in contact with the thin film of water, the solids held in solution are separated and adhere to the bottoms of the pans, in the same manner that stalactites form on the roof of natural caves.

In operating the Purifier the water is pumped in and distributed into the upper pans through the pipes leading into each pan. These pipes extend below the water level of the pans and form a water seal which prevents the steam from getting into the feed pipe and causing a water-ram. When the pan is filled, the water flows over the sides and following the under surface, flows in a thin, uniform sheet along the bottom until it reaches the center, when it falls into the pan below, and so on over each successive pan until it reaches the bottom of the shell, from which it passes through a pipe into the boiler.

The water, flowing in a thin, uniform sheet along the under surface of the pans, and being subjected to the direct action of the steam, is heated to the boiler temperature, and parts with the scale-making properties it contains, the greater part of which adheres to the under side of the pans.

While the Purifier is in operation, the pans remain full of water and afford ample settling chambers for the heavier solids, such as mud, sand, etc., while the carbonates, sulphates, silica an other hard scale-making properties adhere to their under sides.

The success of the Purifier is altogether due to the use of this under surface, as by its use only, can the sulphate of lime, sulphate of magnesia and silica of lime be removed from the feed-water before going to the boiler.

Water, containing large quantities of the sulphates of lime and magnesia and little carbonate or silicate of lime, will cause a soft formation on the under sides of the pans in the Purifier, but if pumped direct into the boiler will cause a very hard scale.

The Purifier can be cleaned with great ease and rapidity.

Chas C. Moore & Co., 30 First street, San Francisco, are the Pacific agents.

The following are some of the users of the Hoppes Purifiers in California: S. F. Gas and Electric Co.; Vacaville Electric Light Co.; Philadelphia Brewery, S. F.; Fredericksburg Brewery, San Jose; Giant Powder Co., Giant; The Alcatraz Co., Carpenteria, Cal.; Telegraph Ave. Electric Road, Oakland; Ice and Cold Storage Co., Los Angeles.

MEETING OF THE PACIFIC COAST ELECTRIC TRANSMISSION ASSOCIATION.

The October meeting of the Pacific Coast Electric Transmission Association was held in the parlors of the Golden Eagle Hotel last month, and was well attended by members of the organization. Those present were C. P. Gilbert, President, Manager of the Sacramento Electric, Gas and Railway Company; Robert McF. Doble, Secretary, Manager of the Blue Lakes Water Company; L. M. Hancock, Chief Electrician of the Nevada County Electric Power Company; Dr. C. Van Norden, General Manager of the Central California Electric Company; E. W. Sutcliffe, Superintendent Central California Electric Company; R. W. Van Norden, Assistant Superintendent Central California Power Company; C. W. Hutton, Chief Electrician Sacramento Electric, Gas and Railway Company; August J. Bowie, Jr., Assistant Electrician Sacramento Electric, Gas and Railway Company; F. T. Vanatta, Chief Electrician Yuba Power Company; E. J. De Sabla, Jr., Manager Nevada County Electric Company; John Martin, Manager Yuba Power Company; T. A. W. Shock, Sacramento Electric, Gas and Railway Company; M. L. Osler, San Francisco; S. Morgan Smith, Yorke, Pa.; C. N. Beal, Manager Power Development Company, Bakersfield; Theo. O. Theberath; T. S. Lee, San Francisco; and M. W. Stewart, electrical engineer.

The meeting was called to order by President Gilbert.

President Gilbert stated that the meeting would be informal, and would be devoted entirely to the reading of technical and scientific papers on hydraulics and electricity and discussions of the same.

S. N. Smith read a paper on hydraulics, and the discussion which followed covered a wide range. This was followed by a paper on "Governors," written by S. N. Knight of Sutter Creek. Mr. Knight was not present, but his paper was the cause for a lengthy discussion, during which water governors of all descriptions came up for criticism, the consensus of opinion being that hand governors give best satisfaction.

Papers on "Insulation," from Henry B. Sears and C. S. Newell of Boston were next read, and these were followed by John Martin of the Yuba Company, who gave exhaustive and practical reasons why glass insulators were preferable to those made of porcelain.

Superintendent Sutcliffe's paper on "Protection Against Lightning" was listened to with great interest.

The Westinghouse Electric and Manufacturing Company has obtained the contract for the apparatus for the electric system of the San Gabriel Electric Company, which will transmit current to Los Angeles, Cal. There will be four 300 kw. two-phase generators. The Scott system of "two-phase, three-phase" transmission will be employed. The final distribution in Los Angeles will be two-phase. A 250 kw. rotary transformer will supply 500-volt current for street railway and power purposes, and two 250 kw. rotaries will furnish current for the 220-volt service.

Mr. Cyrus Baker, Jr., of Baker & Co., New York, the leading dealers in platinum in the United States, has been in San Francisco on business during the past month.

NEWS NOTES

POWER.

Redding, Cal.—Frederick W. Ludovici filed water right to 2,000 inches of the waste waters from L. F. Heuster's sash and door factory to be used for generating electric power.

Salt Lake, Utah.—Manager Spence of the Humming Bird mine states that an electric plant will shortly be put in.

Hanford, Kings county, is soon to be supplied with an electric transmission plant. H. G. Lacey, owner of the electric light plant at Hanford, is making arrangements to build a line from Fresno to Hanford. Mr. Lacey has been at it a long time.

Riverside, Cal.—Trustees—The contract with the Riverside Trust Co. for the use of electric power was read and the president and clerk of the board were instructed to execute the same. The contract calls for the use of from 10 to 20 or more horse power.

Los Angeles, Cal.—The work on the new power-house for the Southern California Power Co. will be commenced at once. The house will contain six dynamos of 1,000 horse power each and several smaller ones. Scheme busted!

Dunfur, Or.—Joseph Sheerer will erect a 100-barrel-capacity flouring mill at his place on Deschutes. He will put in a dynamo to manufacture electricity for lighting the premises.

Pasadena, Cal.—R. E. Nickel states that the Red Rover mine at Acton, owned by Senator White, G. Dennis, Judge Ross, et al., is making arrangements to develop electricity, on the Big Rock crack.

Bakersfield, Cal.—The surveyors of the Kern River Electric Power Co. will at once begin surveying a route from Caliente creek to Los Angeles, obtaining rights-of-way as the work proceeds. They do lots of surveying.

Los Angeles, Cal.—The Los Angeles Electric Power Co. has completed plans and specifications for their plant, and it is expected that bids will now be called for, the work of putting in an electrical plant to begin at an early date and rushed to completion next July. What company is this?

Paso Robles, Cal.—The two-inch steel shaft between the high and low pressure cylinders of the Sperry Flour Mill was broken. The engine was running the electric power plant and the city of Paso Robles was left in darkness.

Tuscarora, Nev.—Operations for placing the electric power plant in position on the Chagnon ranch will begin at once. Mr. Boyce a Salt Lake electrician, will superintend the erection of the works.

Los Angeles, Cal.—In order to accelerate the work on the water tunnel it is contemplated to put in a turbine wheel and dynamo. This will insure progress of about 200 feet per month.

Los Angeles, Cal.—The Southern California Power Co. of Redlands has begun the erection of a power-house that will cost $35000.Thornton & Lenner of Los Angeles have the contract. What will they do with the contract.

Riverside, Cal.—It is proposed to establish a flour mill here if a low rate for electric power can be obtained from the City Trustees and some assurance from the Chamber of Commerce.

Butte, Mont.—The new electric corporation has been granted a franchise for 25 years for the right to erect and maintain poles and wires over a route beginning at the north end of Placer street and along the county road about two and a half miles to the corner of section 35.

Oakland, Cal.—The rock crusher which E. B. Stone has placed in position at his quarry near Lake Chabot will be run by electric motors, the power being secured from the Oakland, San Leandro & Haywards electric road.

San Jacinto, Cal.—Trustees—Ordinance passed granting C. E. Chambers and assigns the right to place, erect and maintain poes, wires, etc., for the transmission of electric energy in the city of San Jacinto for motive power and heating and lighting purposes.

An electric transmission power plant capable of operating 600 stamps is to be erected by the Alaska Treadwell Mine Co. beyond the Gastineaux channel to operate the machinery recently put in.

Tucson, Ariz.—A corporation has been formed by J. DeW. Burgees G. H. Sissoo and A. Teegarden, the purpose of which is to control electric plants nd appliances for generating, developing and conveying electricity for power, heat, etc.

Redding, Cal.—B. C. Hall has filed a water claim for 85,000 inches of the waters of the McCloud river. He proposes to generate electrical power, which will be used for mining purposes, and will also be conveyed to Keswick and Redding.

Fresno, Cal.—The San Joaquin Power Co. hove perfected plans by which the system will be extended to Hanford, with branches to the most important points between Fresno and that place. Construction will commence at once.

Elsinore, Cal.—The committee appointed to investigate the electrical proposition of Prof. C. G. Baldwin of Claremont recommends that a corporation be formed of all those who wish to use the system among themselves. The electrical company will be required to spend not less than $10,000. The committee are soliciting subscriptions toward the preliminary work and permanent organization. J. A. Jones, Oceanside, says he will pay cash for bonds and bid for putting in the system.

Marysville, Cal.—John Martin, E. J. De Sabla and R. R. Colgate, New York capitalists who recently secured F. W. Page's franchise for the erection of an electric lighting and power plant in this county, announce that they will immediately install an electrical plant in the foothills back of Brown's valley, 20 miles from Marysville. It will be of 1,500 horse power in three units of 500 each. Power and light will be transmitted to various points in the neighborhood. Capital to be invested, $200,000.

Los Angeles, Cal.—The San Gabriel Electric Co., which is developing water power in the San Gabriel River, expects to be able to supply arc and incandescent lights and power for all purposes by the first of February next. Few people have an idea of the amount of work which is being done to develop water at the headwaters of the San Gabriel. The power company has had 150 men employed on tunnel work alone, nearly all the tunnels, the longest of which is 1,600 feet, being worked from both ends, day and night, in eight-hour shifts.

Los Angeles, Cal.—Redlands—J. W. Dobbs has made a filing of 150 inches of water two miles north of Mill creek in the canyon. It will be conveyed in a flume 2,200 feet to point opposite T. R. Aker's pace, to be used to generate electricity for Lakeview, Perris, Menifee and Elsinore, for heating, light etc.

Seattle, Wash.—It is probable that the Red Shirt mine in Methow district, John A. Stewart manager, will adopt electric process this winter.

Etna, Cal.—Alex Parker Jr. and his brother have filed notice to the right of 150 inches water in Whiskey creek, in Etna district, to be used for electric and milling purposes.

Nelson, B. C.—Cranbrook Power & Light Co., incorporated. Capital stock, $100,000. Head office, Cranbrook. Object to establish and operate electric works, power houses, etc.

Jackson, Cal.—C. B. Zeck, superintendent of the Red Hill mine, near Butte basin, proposes to use electricity for motive power at the mill.

Colton, Cal.—There is talk of electric power being put in the marble works.

Helena, Mont.—The Connecticut & Montana Mining Co. intend putting in an electric power plant to operate the Ontario mine.

Jackson, Cal.—C. B. Zeek, superintendent of the Red Hill mine, intends to put in electric power to operate the mill at an early date.

Red Bluff, Cal.—Mr. Ludovici proposes to establish an electric distributing station either at Cottonwood or at Anderson and distribute electricity to any point within a 50-mile rdaius. Mr. Ludovici will personally do the distributing, as he knows how to do it without any loss.

Oakland, Cal.—The new beet sugar company, recently incorporated by G. W. McNear Sr., G. W. McNear Jr., G. E. Fairchild, O. M. Vesper, Louis Sloss, C. M. Cooke, et al., will erect an electric power plant to run the mills.

Los Angeles, Cal.—San Gabriel Electric Light Co., with Miller & Bassett cement work in tunnels, etc., of the San Gabriel Electric Co.'s conduit at 61 cents per lineal foot.

Chico, Cal.—Richard White, local director of the Butte County Electric Light & Power Co., states that capital has been subscribed to construct the entire plant, and that men will be on hand to commence the work of construction within a few days.

Riverside, Cal.—Trustees—Supt. Worthley stated it would cost $300 to furnish C. E. Maud with electric power for his packing-house.

Blue Lake, Cal.—J. W. Frank and John McCuish of Red Bluff, who are now working the Jumbo mine, will erect a stamp mill on the place and use electricity for motive power.

Jackson, Cal.—The South Eureka people and the Blue Lakes people have closed a contract by which the mill of the South Eureka will be equipped with electric power.

Riverside, Cal.—Chas. Stebbinger has purchased six acres bordering on the canal and will improve it by pumping water by electricity from the Gage canal.

San Francisco Cal.—An electric light and power plant will be erected at the Corral Hollow mines. Power will be transmitted to Stockton, Livermore and other points in the sweet bye and bye.

Yreka, Cal.—The Siskiyou Mining Co. is about to put in an electric plant at their property on Klamath river. The work will be done by G. Francis.

Austin, Nev.—The Nevada Co. will put in an electric plant in their new mill at Ione. Most of the machinery to be used in the plant is now at Ione.

Grass Valley, Cal.—Electricity will be used for operating the W. Y. O. D. mill in place of steam, arrangements having been completed with the Electric Power Co. for this purpose.

Marysville, Cal.—Consolidated Nugget and Coronado Mining & Milling Co. Principal place of business, Smartsville. Purpose, operate mines, deal in electric light, heat and power, etc. Capital stock, $1,000,000. Directors—Dr. E. F. Holbrook, R. Beatty, P. A. Hanley, et al.

Redlands Electric Light & Power Co. elected the following officers and directors at its annual meeting: H. H. Sinclair, president; Geo. B. Ellis, vice-president; F. G. Feraud, secretary; First National Bank, treasurer; Henry Fisher, J. H. Fisher, J. F. Drake and Dr. E. T. Painter completing the board of directors.

Tacoma, Wash.—According to the report of Engineer Nicholson, the city has a valuable water right on the Puyallup River near Lake Kipowsin. The results of the various measurements taken were figured out. The work was nearly all done before the rains of the last few days had raised the water, so that the river was at or near its lowest point. There are between 250 and 300 cubic feet of water flowing through the channel each second, according to the report. This volume of water, with a fall of 200 feet will give a horse power of between 5,000 and 6,000. The current is swift and the engineers think the location a good one for a power plant, provided the river does not get lower than when measured this week. The distance by road is about 26 miles, but a line established across country would be only about 20 miles in length.

Independent Telephone Company.—The San Francisco Board of Supervisors has given favorable consideration to a recent petition from the People's Mutual Telephone Company, asking for an extension of one year's time in which to expend $100,000 in the construction of telephone lines throughout the city. The company claimed that it had been delayed by litigation directed against it by competitors. The company guarantees to supply the city with free 'phone. and to allow the city free use of its conduits for fire and police telegraph wires, and also to pay 2 per cent of the company's gross receipts into the city treasury.

Mr. Appleton, of the Electric Storage Battery Company of Philadelphia, recently visited the city on business connected with the installation just placed in operation by the San Francsco Gas and Electric Company.

Incorporated—Pacific Coast Electrical Co. Capital stock, $25,000. Directors—J. J. Gottlob, M. Marx, R. E. Marx, T. M. Crane and J. Maloney.

Articles of incorporation of the Pacific Arc Lamp Co. were filed by R. B. Elder, Scott Elder, W. H. Nelson, E. C. Drew and Ida C. Chaquette.

Los Banos, Cal.—John Kearns, division superintendent of Sunset Tel. Co., has been taking subscriptions to raise a fund to bring their line from Newman to Los Banos.

Lewiston, Mont.—J. H. Carters contemplates building a telephone line from Grass Range to Gilt Edge.

Nordhoff.—A new local telephone line will soon be put in operation connecting with the main line at Nordhoff.

Monterey, Cal.—The Sunset Telephone Co. have decided to erect a branch line from Monterey to Seaside.

RAILROADS.

Helena, Cal.—The Pasadena & Los Angeles R.R. Co. will spend $125,000 in improvements.

Los Angeles, Cal.—An official of the Pasadena & Pacific R.R. Co. states that the present horse-car line to the Soldiers' Home will be replaced by an electric line.

Pasadena, Cal.—The Electric Railway Co. was granted a franchise to lay a track on Dayton street. The privilege is to last for a term of 23 months.

Los Angeles, Cal.—It is reported that the Southern Pacific Co. will electrize its line from Los Angeles to Santa Monica.

Tacoma, Wash.—The Tacoma Railway Co. is building four large electric cars of 100 horse power each. The company is putting in a concrete floor and arranging to increase its boiler capacity.

San Bernardino, Cal.—Walter Kohl, superintendent of the Highland motor road, will visit Chicago to investigate the new electric storage battery system of operating electric roads, with a view to adopting it for the road.

Mokelumne Hill, Cal.—The Blue Lakes Water Co. has decided to extend its wires to Sutter Creek. The work will probably be completed within three weeks. In addition to furnishing the Amador Electric Railway & Light Co with energy, power will also be furnished to the South End mine and the Argonaut.

Seattle, Wash.—James Hopkirk of Oakland is here negotiating with contractors for the construction of an elevated single track electric railway from Skaguay over the White Pass. The proposed road will cost about $100,000 and will be commenced within three months.

Grand Forks, Wash.—W. C. Dougall has organized a company, with headquarters in England, for the purpose of erecting two refineries. There will be electric tramways in connection with them.

Riverside, Cal.—An ordinance granting the Riverside & Arlington St. R.R. Co. an extension of one year in which to build and electrize certain portions of its road was passed to a second reading.

Some of Lewiston's capitalists have under consideration a plan for an electric railroad to connect Nez Perce and Palouse, the road to be about 15miles long. To ascend the Lewiston hill will require a 3 or 4 per cent. grade.

Los Angeles, Cal.—The building of an electric street railway in Redlands has been frequently discussed, and recently it was decided by the Redlands Orange Grove & Water Co. to subscribe to bonds in the proposed new road to the amount of $2,000.

Pasadena, Cal.—A meeting will be held of the stockholders of the Los Angeles & Pasadena Electric Railway Co. for the purpose of considering the question of creating a bonded indebtedness in the sum of $1,000,000.

Pasadena, Cal.—Manager C. W. Smith was in consultation with N. C. Carter regarding the advisability of extending the electric road through Lamanda Park and Santa Madre. No conclusion was reached. Smith states his company will extend an electric line along the foothills. The electric company are expending $40,000 for improving their machinery.

Butte, Mont.—The Great Railway Co. having been granted a franchise to build an electric line to Walkerville, will proceed with work at once. It provides for a loop on Broadway, and from Wyoming street it will proceed to Walkerville by a double track line. The line on Main street is to be single track. The line must be completed and in operation by Aug. 31st, 1898.

Tucson, Ariz.—A corporation has been formed by J. DeW. Burgees, G. W. Sisson, H. D. Underwood and Thos. A. Teegarden, the purpose of which is to own, operate and control railroads, tramways and canals, etc. Capital stock, $2,500,000.

The directors of the Market Street Railroad are contemplating building an electric railway to the Cliff House along the southern limits of Golden Gate Park in place of the steam dummy road. The expense of converting into an electric road will cost about $75,000. It is also reported that the other steam road running to the Cliff House will be changed into an electric road.

Albuquerque N. M.—Incorporated—New Mexico Railroad & Coal Co. Principal place of business, New Jersey. Directors—John Davis and John Kelly, New York, and Ed C. Mowbray, Brooklyn, N. Y. Capital stock, $4,000,000. The object of the company is to construct, equip, etc., telephone and telegraph lines, railroads etc.

Los Angeles, Cal.—Mr. Carl Rosencrans has joined with the Traction Co. in an endeavor to construct a railroad to San Pedro. It is possible that the proposed line will connect with the Redondo railway and electrize that portion of the road necessary to make a line to that resort, as well as to San Pedro.

Berkeley, Cal.—Frank M. Wilson of Berkeley has signified his willingness to give $1,000 towards a bonus to induce the Telegraph avenue or Grove street car lines to extend a system to North Berkeley. Mr. Wilson made such an offer to the Grove street line some weeks ago, with a proviso that the company contract before September 6th to build the line. The proposal had not been accepted, however. A committee of North Berkeleyans has now been organized, consisting of F. M. Wilson, J. J. Dunn, John McCarthy, E. C. Marliave, W. G. Sanborn and Harry J. Squires to inquire into the possibility of securing a sufficient bonus and to map out a route for the road to follow.

The committee is working under the auspices of the North Berkeley Improvement Club, which began the present agitation for a road. At the meeting of the club to be held Tuesday evening, a subscription list was opened, and F. M. Wilson renewed his offer of $1,000. The route proposed for the Grove street line to take, so as to reach the north end of Berkeley, is as follows: Instead of turning into Oxford street from Allston way, to continue down Allston way to Shattuck avenue; along Shattuck to University avenue; thence to Oxford street, to College way, to Euclid avenue, to Hilgard avenue, to Arch street, to Vine or Rose streets, to Shattuck avenue; to complete a loop including both sides of Shattuck avenue by going to Milvia or Grove streets and along one of the latter to rejoin the present line west of Shattuck avenue. It is estimated that the cost of building the line would be about $20,000.

Phoenix, Ariz.—Tucson is erecting an opera-house, the stage mechanism of which will be operated by electricity.

Acton, Cal.—The telephone line has been completed to connect with the Western Union Telegraph Co. at Ravenna.

Incorporated—Southern California Electric Supply Co. Principal place of business, Los Angeles. Directors—Russell H. Ballard, D. B. Kearney, G. P. Curtis, et al. Capital stock, $50,000.

LIGHTING

Sacramento, Cal.—The matter of the proposed municipal lighting plant was laid over till November 8th and then postponed indefinitely.

Grants Pass, Or.—Geo. I. Brown, general manager of the power house, states that they will put in another dynamo.

Colfax, Cal.—The electric plant of C. W. Langstaff and E. R. Wilson at Forest Hill is nearing completion. It will be 30 horse power.

An electric light is to be put in at Lakeview, in Eastern Oregon.

Payson Council will add more lamps to the electric light system to make the number up to 400 this winter and to 500 next winter.

Reno, Nev.—Bids will be received by the undersigned up to 3 P. M. November 22nd for the purchase of Reno electric light bonds. Interest 6 per cent. per annum.

Astoria, Or.—The steamer Geo. W. Elder will be renovated and an electric lighting plant put in.

Acton, Cal.—C. G. Hayward of Calremont, Cal., was here in the interest of the new company that was organized to furnish electric power and light for Acton and Randsburg.

Riverside, Cal.—The Wildomar Water Co., recently incorporated, will be supplied with electric power by the new electric company, who propose to generate power in Mill Creek Canyon.

Eugene, Or.—E. M. Force is canvassing city for contracts for service from electric light system he proposes to establish.

Long Beach, Cal.—The electric light company have remodeled their building. The dynamos will now be capable of furnishing 2,000 lights, the number in use being about 650.

Emeryville Trustees will invite bids for furnishing the city with six arc electric lights.

Jackson, Cal.—It is reported that Plymouth is to be supplied with electric lights in the near future, the electric plant to be placed at Drytown.

Los Angeles, Cal.—J. W. Dobbs has filed right for 150 inches water to be conducted in open flume and used to generate electricity.

Los Angeles, Cal.—An effort will be made in a short time to organize the owners of fine homes in Covina into a company to secure electric light for the town.

Chico, Cal.—Trustees—A resolution was passed granting the Butte County Electric Light & Power Co. the privilege of erecting poles and stringing wires along the streets of Chico for the purpose of conducting electricity for furnishing light and power in the city.

Pasadena, Cal.—The Pasadena & Los Angeles Electric Co. is about to add a new boiler and generator to its power plant to cost about $38,000.

Hueneme, Cal.—An electric light plant will be used by the night gang who will be put to work on the proposed Oxnard beet sugar factory to be located in sub-division 31, Rancho Colonia.

Lakeport, Cal.—E. S. Martin is interviewing the residents of the town, and if he meets with sufficient encouragement will put in an electric light plant in the near future.

Honolulu, H. I.—Mr. Moir of Honolulu will put in a complete electric lighting pant in his sugar mill and buildings.

Chehalis, Wash.—Minard Haskell will soon select an engine to run an electric light plant.

Milton, Or.—Council—B. F. Brown, the local electrician, will examine the city plant to determine the additional power that will be necessary to supply private parties.

Woodland, Cal.—It is reported that the owners of the electric light system contemplate putting in a 100 h. p. Corliss engine and otherwise improving their plant.

Los Angeles, Cal.—Articles of incorporation for the Los Angeles Edison Electric Co. were filed Saturday with a capital stock of $500,000. Directors—T. Addison, F. M. Pickering and J. E. Green. This company takes the place of the West Side Lighting Co.

Medford, Or.—Council—R. A. Proudfoot submitted a proposition to light the city with 40 incandescent lights.

Salmon City, Idaho.—An electric light plant is to be put in here this fall.

Riverside, Cal.—Trustees—Motion was passed instructing Superintendent Worthley and Geo. Brown to estimate the cost of a line of wire to Casa Blanca.

Sonoma, Cal.—The new electric light plant at the Home for Feeble-Minded is completed. There will be about 500 lights. A line will also be extended down to Eldridge depot.

Portland, Or.—Eugene—Howard M. Force of New York has petitioned Council for franchise for use of streets in operation of new electric light system. If franchise is granted he will put in improved machinery.

Anaconda, Mont.—Citizens of Sheridan held a meeting for the purpose of discussing the advisability of putting in electric light system. Mr. Fred Hermesmyer is one of the chief promoters of the enterprise.

Peninsula Lighting Co. Purpose of maintaining gas and electric light plants. Principal place of business, San Francisco. Capital stock, $2,000,000. Directors—J. L. Howard, O. Ellsworth, T. F. Loist, J. C. Jones et al. Articles filed in Santa Clara county to enable the corporation to do business in that county.

Logan, Utah.—Bids are called for the furnishing of 26 arc lights, each 1,200 candle power, for the lighting of the streets of Logan; also for 14 incandescent lamps of 16 candle power each. Term to commence Jan. 1st, 1898, and end March 31st, 1900. Bids may be filed with the City Clerk.

Redding, Cal.—The town of South Park will soon be lighted by electricity. Robert Gillespie recently returned from San Francisco, where he purchased a 20 h. p. steam engine and boiler and a complete electric plant.

Hyrum Electric Light & Power Co. Principal place of business, Hyrum. Capital stock, $50,000. Directors—J. F. Wright, J. L. Jensen, J. Unsworth, et al.

Palo Alto, Cal.—City Trustees will soon receive bids for a franchise for the installation of a gas plant for lighting, cooking and heating. Petition will be circulated to be signed by citizens in favor of the propositon for the benefit of parties who contemplate submitting bids.

Riverside, Cal.—Improvements are being made at the city's electric sub-station, whereby an additional 100 h. p. will be obtained. A third circuit will be put in and other improvements made.

Placerville, Cal.—Supervisors will receive bids up to 2 p. m. Dec. 7th for a franchise to construct, erect, etc., poles, wires etc., for the transmission of electric power for power and lighting purposes upon the public streets, roads and highways of Eldorado county. A. S. Bosquit, clerk.

Albuquerque, N. M.—The officials of the mechanical department of the Santa Fe have decided that until more satisfactory electric head lights can be furnished the present head lights would be used. The two electric head lights which were used for experimental purposes have been sent back to the manufacturers.

Los Angeles, Cal.—The bid of the Los Angeles Electric Light Co. was referred to the committee on lighting. The bid was $9.50 per month for each 2,000 candle power light, a reduction of 25 cents on the rate now charged. All bids rejected.

Santa Ana, Cal.—Trustees—The matter of installing a water motor and dynamo at the city water works for the furnishing of electric lights for the city offices came up and was discussed.

Haywards, for lighting the streets for one year, from Nov. 1st with 16 arc electric lamps, 2,000 candle power. The board reserves the right to reject any or all bids. James A. Collins, Town Clerk.

Azusa, Cal.—Some of the prominent citizens of the town held a meeting this week to take steps to introduce the use of electricity into the town as soon as the San Gabriel Electric Power Co. shall be ready to serve them.

Placerville, Cal.—Incorporated—El Dorado Light & Power Co. to manufacture and produce electric light, power and heat from the waters of the South Fork of the American River. Principal place of business, Sacramento. Capital stock, $300,000. Directors, F. F. Smith, W. C. Hendricks, T. A. W. Shock, et al.

Slocan City, B. C.—Corell & Felt are making arrangements for an electric light plant. They will canvass the city, and if they can make arrangements to furnish 600 lamps or over, a $7,000 electric power plant will be put in. The Brandon wate franchise has been transferred to Corell & Felt, and the plant will be fitted up with a Pelton wheel and will have a capacity of lighting a city of 2,000.

Prescott, Ariz.—City Engineer Fisher is about completing his final surveys of reservoir sites on Potts and Aspen creeks, where it is estimated sufficient water can be stored for a town of 25,000 people and power furnished for electric lighting, etc.

San Leandro, Cal.—Trustees—A large plan of the proposed electric light system was exhibited at the meeting and was adopted unanimously. The plans show 5 arc lights and 87 incandescent lights. Mr. Cartright of the Ft. Wayne Electric Co. was present.

Auburn, Cal.—City Trustees—The bid put in by the estate of F. H. Bell for lighting the streets with 50 incandescent lights of 25 candle power at 75 cents per month each for a term of five years was rejected and the clerk ordered to readvertise for bids.

Ukiah, Cal.—The City Trustees awarded the contract for lighting the town to the Mendocino Electric Co. There will be 65 32-candle street lights at $1.50 each. There will also be three 16-candle power lights in the city hall, engine-house and city prison. These will cost $2.25 each.

Los Angeles, Cal.—Sealed proposals were received by the undersigned up to 11 a. m. Nov. 15th for lighting the streets of the city with electricity for the period of one year from and after Jan. 1st. Certified check to the amount of $500 must accompany each proposal. Council reserves right to reject any and all bids. C. H. Hance, City Clerk.

Covina, Cal.—The Chamber of Commerce is advocating the electric light system. At their meeting W. Ormiston was elected president and V. Greever, secretary. It is the purpose of the company to purchase electric energy from the San Gabriel Electric Co. A corporation will be formed with a capital stock of $25,000. The cost of the plant will not exceed $4,000.

Coeur d'Alene, Idaho.—Fire has destroyed the Coeur d'Alene Illuminating Co.'s plant, causing a loss of $8,000, with $5,000 insurance. Two dynamos, a fine engine and other equipments of the building are a total loss. Mr. Will, the owner of the plant, says that he will rebuild.

Nelson, B. C.—Council—Ordinance has been passed providing for the contract with the Nelson Electric Light Co. for lighting the city, and consists of 20 and as many more standard 1,200 candle power arc lights and standard 16 candle power lamps as may be required from time to time during a term of five years.

New Whatcom, Wash.—Council—Mayor J. J. Weisenburger proposes to utilize boilers in the new pumping station lately put in by the city at a cost of $6,000, to furnish steam for an engine to operate dynamo for a city electric light plant. He believes arrangements can be made with some electric supply company to furnish all the machinery, wires and other appliances necessary to operate the plant. Referred to light committee.

Los Angeles, Cal.—Bids for the furnishing of electric lights for the city of San Diego for the year beginning the 1st of April next have been referred to the City Attorney, as it is alleged now that the bid of the San Diego Gas & Electric Light Co. was not according to advertisement, and that it is therefore impossible to tell which of the two bids is the lower. If the City Attorney decides that the bid was not properly made, new bids in all probability will be asked for. All bids rejected.

San Diego, Cal.—The delegates received bids for lighting the city for the year beginning April 1st, 1898, as follows: J. T. McCrosson, 81 arc lamps, 2,000 candle power each, on masts, at $11 per month each; 39 same low arm, $10.50 per month each; additional lamps same candle power, $8 per month each. A certified check for $1,800 accompanied the bid. San Diego Gas & Electric Light Co., 81 arc lights, 2,000 candle power, on masts, and 39 on low arms, $10 per month each, moonlight schedule; when moon is obscured lights to be turned on at 30 minutes' notice at 5½ cents per lamp per hour. Additional lamps $10 per month each. With this bid was a certified check for $2,000. The bids were referred to the electric light committee. J. T. McCrosson of San Francisco then addressed the board saying he stood ready to put in an electric light plant guaranteed to furnish 25 per cent. more light than the present plant and run it for five years at $1,500 per month, and then turn it over to the city at the expiration of that period upon payment of $1.

San Diego, Cal.—Resolution adopted directing the City Engineer to prepare plans and estimates of cost of installation and equipment of an electric light and power plant to be operated by water or steam, the water power to be obtained from the new city water system.

Los Angeles, Cal.—The West Side Lighting Co. has purchased a 125 light Brush arc machine.

TELEPHONES.

Bakersfield, Cal.—Notice is given that on December 3rd at 2 P. M. the Sheriff will sell all phones, receivers and transmitters amounting to 43, switch boards, wires, poles, etc., of Mt. Whitney Telephone & Power Co. H. L. Borgwardt, Jr., Sheriff.

Mariposa, Cal.—J. Kearns of Stockton, superintendent of the Telephone Co., was in Mariposa county making arrangements for the completion of the telephone line between Coulterville and Mariposa.

Spokane, Wash.—Managfier C. B. Hopkins of the Inland Telephone & Telegraph Co. states that a line will be put in between Heppner, Or., and Arlington.

Salt Lake, Utah—L. Bradford Prince, representing agents of the Automatic Tel. Exchange Co., states that he will organize a company in Utah for the purpose of putting in the automatic system here.

Santa Ana, Cal.—Ordinance passed granting the Sunset Telephone & Telegraph Co. permission to erect, maintain, operate, etc., wires, poles, etc., for the transmission of electricity for telephone and telegraph purposes.

Rossland, B. C.—F. D. Wright of Rossland Messenger Co. will establish messenger service in Nelson, and it will cost about $1,000 to erect poles and put in 300 electric call boxes.

Oakdale, Wash.—Ordinance has been passed granting the Inland Telephone & Telegraph Co., its assigns, etc., right to erect, maintain, and operate in the town of Oakdale poles, wires, etc., for the transmission of electricity for telephone purposes.

Los Angeles, Cal.—The Sunset Tel. Co. have filed diagram sketches at the City Hall, showing the route of their proposed lines in the underground district of the city.

Los Angeles, Cal.—Electrician Ira J. Francis of the Fire Department is preparing plans for the proposed police signal system. He estimates that $4,000 will be necessary for labor, line work, supplies, etc., and $5,000 for purchase of boxes and central station fixtures.

Hanford, Cal.—The Mount Whitney Telephone Co. have filed a petition in insolvency in the Superior Court of Tulare county. The liabilities of the company aggregate $4,662.71; value of personal property, $8,450; incumbrances, $2,972.37.

Downieville, Cal.—N. S. McKinsey of the C. & O. Telegraph Co. has been interviewing the people with regard to building a telephone line from Susanville to Janesville and Millford.

Brentwood, Cal.—Four carloads of posts for the extension of the Long Distance Telephone Co.'s lines from Antioch to Brentwood have been unloaded at the depot.

Riverside, Cal.—Trustees—A communication from C. W. Hinchcliffe of the Sunset Telephone Co., asking permission to use the city's electric light poles on Magnolia avenue, upon which to string telephone wires, was referred to the electric light committee.

Los Angeles, Cal.—Mr. Sabin, general manager of the Sunset Telephone Co., states that about 10 blocks of underground work is completed for the telephone system between here and Portland. He also states that a line to Catalina Island would cost about $1,000 per mile for the cable, and it would not pay the company to undertake the scheme alone.

Yreka, Cal.—Superintendent Lawrence of the Sunset Telephone line will make arrangements for the immediate construction of a telephone line over to Scott Valley, which will be continued to Weaverville, where it will connect with the line throughout the State. Two carloads of poles have already arrived.

Los Gatos, Cal.—Sealed proposals will be received by the undersigned up to 5 P. M. November 15th for furnishing and installing a fire alarm system according to specifications on file at office of clerk. Certified check for 10 per cent. of proposal must accompany each bid. Board reserves right to reject any or all bids. G. A. Butler, clerk.

Esparto, Cal.—A. W. Kelly, T. Steele and F. E. Caine were appointed a committee at a meeting of citizens to investigate proposed offers of material, etc., for the equipment of the proposed telephone line from Capay to Rumsey. It was also decided at the meeting that citizens would build the line to Capay Valley. Persons present signified their willingness to subscribe for the greater part of the stock necessary to build the line, which will be about $1,000.

Randolph, Utah.—The merchants of Evanston are willing to furnish instruments and wire, providing the people of Woodruff and Randolph furnish and set the poles for the proposed telephone line from Evanston to Randolph. It is intended to continue the line shortly to Montpelier, a distance of ninety miles from Evanston. The Star Valley people also contemplate running a line to Montpelier from Afton to connect. Chas. Kingston, an electrician, guaranteed to see that the work was properly done.

Santa Ana, Cal.—Trustees—Petitions were received from residents of the Blee Addition and West Fourth street for more electric lights. Mayor Avas informed the board that he had seen Mr. Holmes in reference to furnishing the city with more lights. Mr. Holmes informed him that he would furnish additional lights for $6 per month, providing the board would put in poles and wires. A number of residents have spoken to Mayor Avas about having lights installed near their homes and expressed themselves willing to stand half the expense of running such lights. Those who want lights on these conditions are requested to confer with the board. The matter of granting petitions for lights on West Fourth street and in the Blee Addition action was deferred.

Los Angeles, Cal.—The West Side Lighting Co. will in a few days change its corporate name and will become the Edison Lighting Co. of Los Angeles, which will equip the company with all the electric lighting patents owned by Thomas Edison. Among these are included the Edison system of underground poles and wires, which the West Side people will adopt at a cost of $100,000. Great news from the south.

A notable change is about to be made at Omaha, Neb., where the new Omaha Thomson Houston Electric Light Company is undertaking the concentration of its station. It has recently placed an order with the General Electric Co., for three monocyclic alternators, each one to be directly connected to a compound condensing McIntosh & Seymour engine. These alternators will be revolving armature, 48 pole machines, each of 300 kilowatts at 150 revolutions, and will be separately executed. They will take the place of a considerable number of smaller machines and will be used to furnish current to an extensive system of 3-wire secondary main, fed from large transformers.

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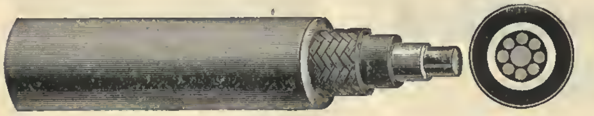

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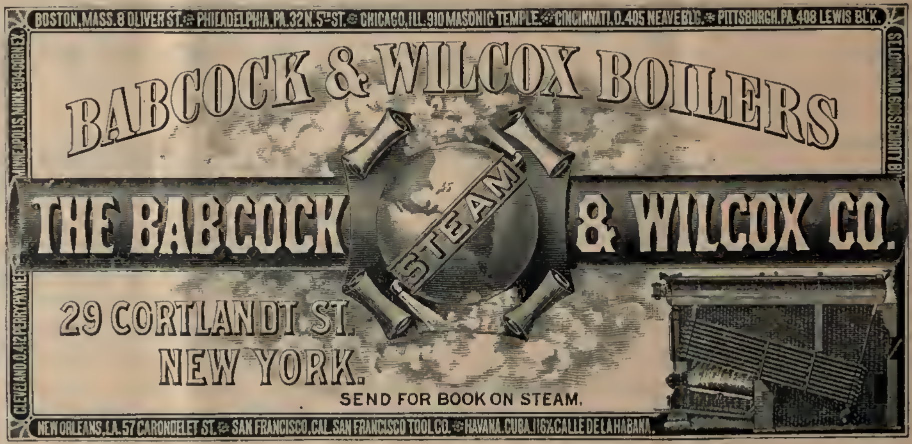

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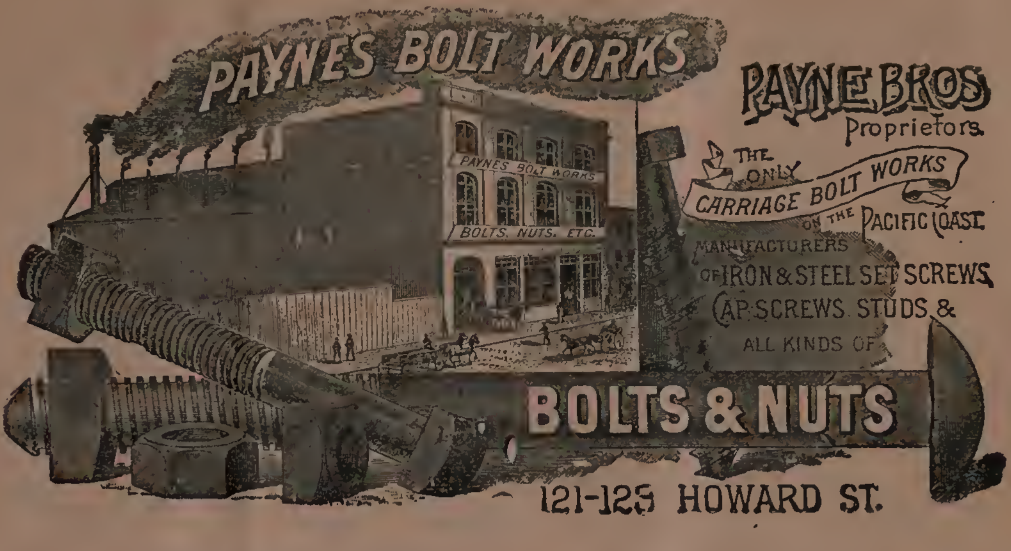
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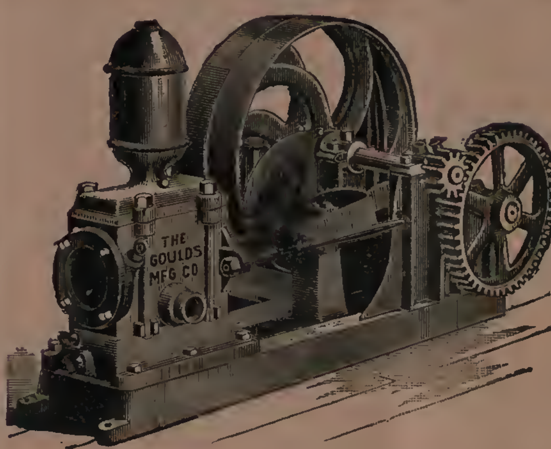

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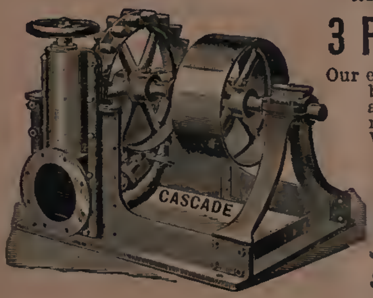

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